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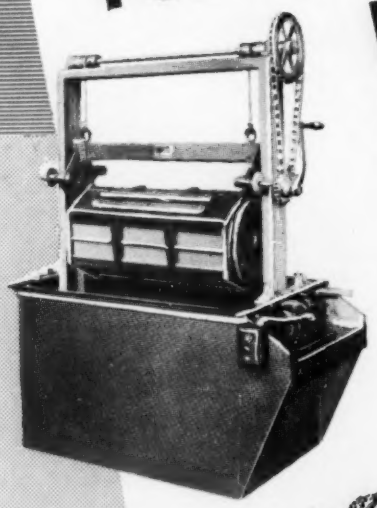

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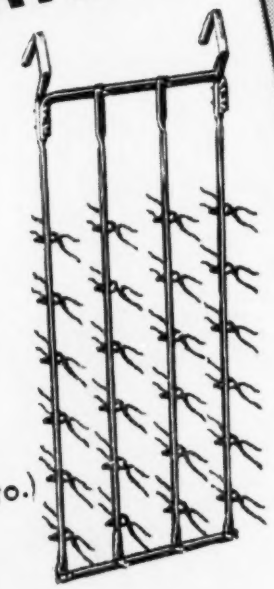

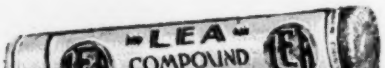

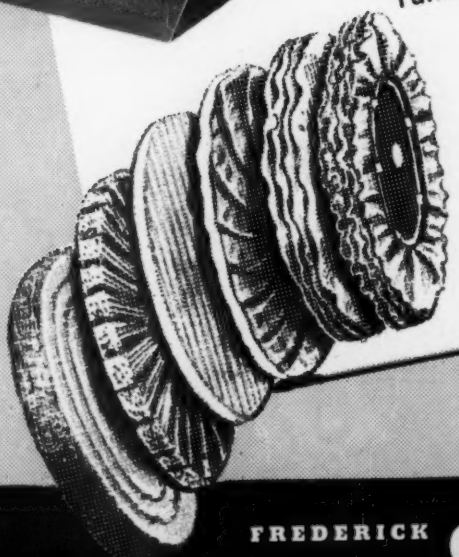

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METAL FINISHING

MARCH 1953 VOLUME 51 • NUMBER 3

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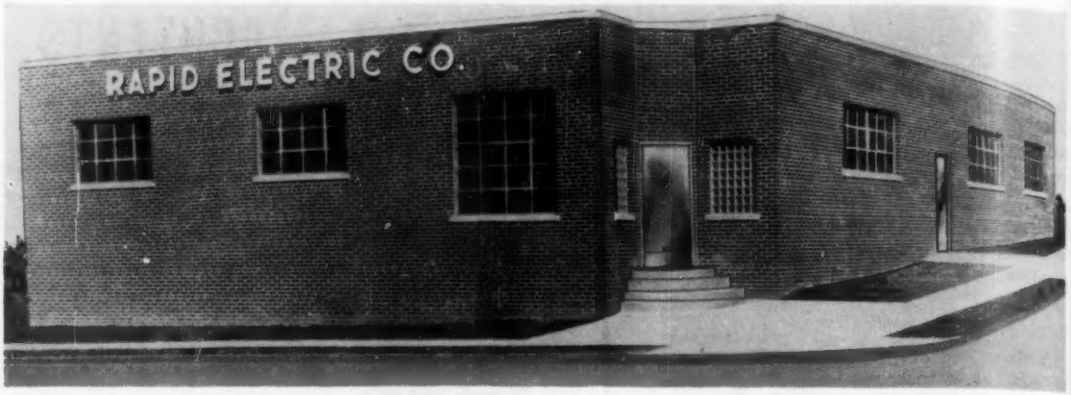

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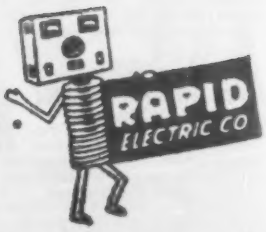
REMEMBER . . . . . 

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The WASHINGTON OBSERVER

Charles A. Ceroni

News and Views from The Nation's Capital

. As soon as wage controls ended, top management in many companies went into their conference rooms and debated, "Shall we give a token general increase now and show that we want to give the workers a break, that we don't have to be forced into it?". For each individual company, this may seem a sound policy insurance against union activity and the tight labor market predicted for 1953. But this reaction - repeated in thousands of firms - is just the thing that would lead to re-imposition of controls. And the businessman who may think that a ceiling on wages is a good thing should remember that we will never have that without having full-scale price controls back too.

. At the time of writing, most consumer durables have been de-controlled, but some appliance items are still under price restriction: ironers and dryers, refrigerators, and dishwashers, among others.

. The Controlled Materials Plan will continue in effect, with certain modifications, through June 30, 1953. Plans are being made to provide for the reduced controls which will be necessary after June 30 to insure that requirements for scarce and critical items essential for our defense are met, it was announced by the office of Defense Mobilization.

. Cobalt and nickel will continue to be tight, apparently because of bigger schedules for jet engine production. Especially in the case of cobalt, there is more going on than meets the eye - imports and domestic production are going up constantly, the stockpiling program has gone well, and present consumption is not particularly great. Yet just a few days ago, the radio and television manufacturers were warned by NPA that allocations for civilian use of cobalt may have to be cut. Nickel supplies are not expected to improve during the second quarter.

. In addition to the loan of 44 million lbs. of aluminum which Canada and Britain are making to the U.S. in February and March, another 44 million lbs. from those sources have been arranged for later in the year.

. Revocation of allocation control over copper raw materials as soon as price controls are removed was recommended by the Primary Copper Producers Industry Advisory Committee at a meeting with NPA. The committee recommended unanimously that the Government remove price control immediately over all copper and copper products. NPA officials told the committee that allocations of copper raw materials for March have been made, but that second quarter 1953 allotment tickets must be honored before unrated orders can be accepted for copper and copper base alloy products. NPA promised to investigate committee reports that the industry has been urged to buy copper bar on the foreign market to be procedded by U.S. fabricators.

. The Defense Mobilization Board has vetoed a suggestion by its Steel Committee for an immediate announcement that steel, copper and aluminum would be de-controlled for civilian use after June 30th. This does not mean that the restrictions will not end, but is merely an attempt to prevent widespread planning now for heavy use after mid-year.

. New processes and products useful to the metal-producing and metal-working industries are described in the Government research reports listed in the current issue of the Bibliography of Technical Reports just published by the Office of Technical Services, U.S. Dept. of Commerce, Washington 25, D.C.

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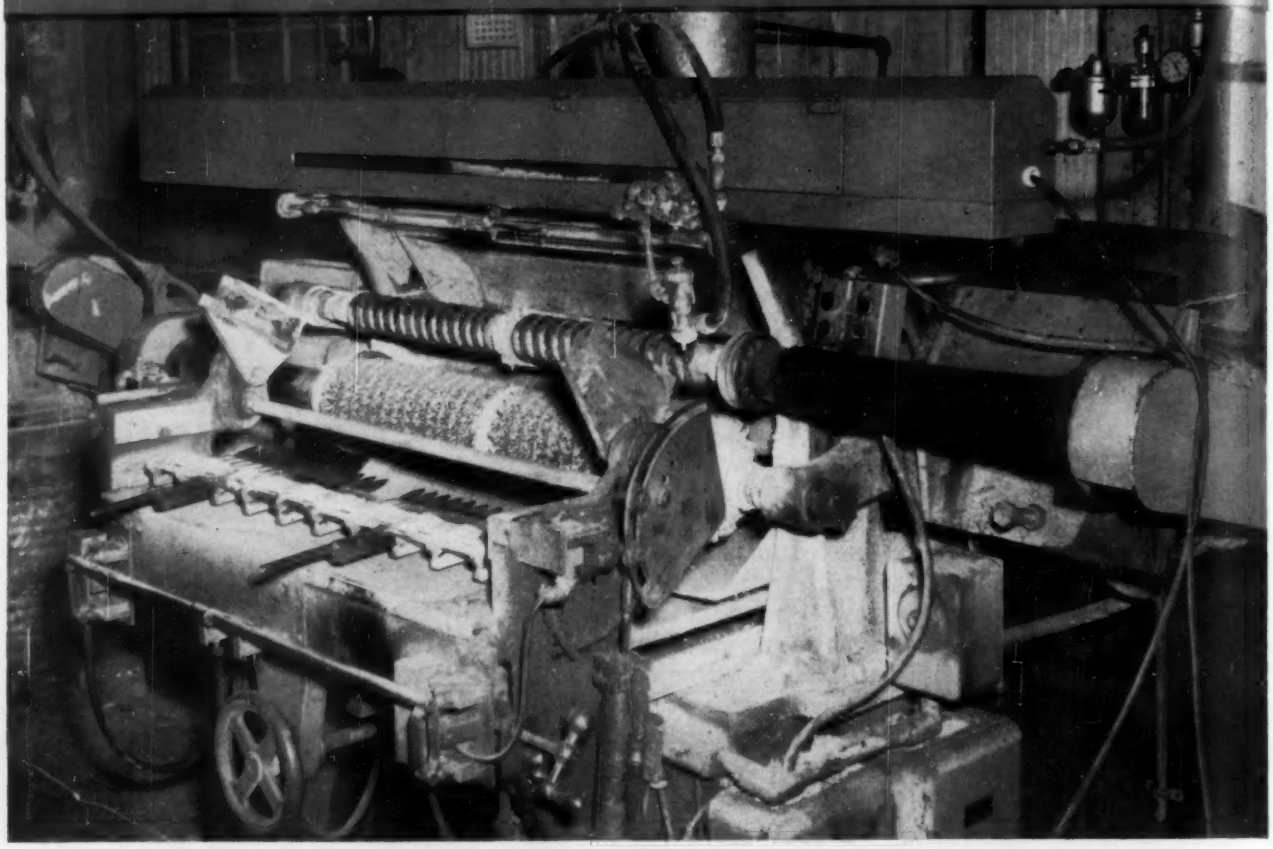

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METAL FINISHING

LUME 51 • NUMBER 3 • MARCH 1953

Some Day You'll Be Asked To Do It

At a recent, exceptionally well attended, local meeting of *The Electrochemical Society*, we had the pleasure of listening to *Dr. Abner Brenner*, who succeeded *Dr. William Blum* as Chief of the Electrodeposition Section of the National Bureau of Standards, discourse on the subject of electrodepositing some of the less common metals from non-aqueous media.

He discussed the use of fused salt and organic baths for the deposition of metals such as tantalum, titanium, zirconium, germanium, beryllium and molybdenum, in the course of which the often inferior type of deposit from the standpoint of the electroplater's requirements was commented upon. Although these processes do not offer much promise at the present time for the production of coatings, they concern the new wonder metals of industry, which have the necessary chemical and physical properties to make atomic age goals possible.

It was only an offhand remark by the speaker, but it made a deep impression on us; the plater may not be interested in these metals as deposits — but they are the metals on which he will some day have to apply deposits. Occasionally we strike upon new pretreatment methods for securing adhesion to the less common metals, such as the one recently described in METAL FINISHING for zinc plating uranium, and the patent literature produces some disclosures from time to time. For the great part, however, the field is wide open. Titanium, the metal with half the weight but all the strength of steel, is the coming aircraft material of construction and will, in all probability, be the most important with which the plater will have to contend, the others undoubtedly following close behind.

There was a time, not too many years ago, when stainless steel, aluminum, Monel, Invar and others offered almost insurmountable adhesion problems for the plater, but the problems were solved in due course. The new problems which will be presented by these new metals will test the ingenuity of members of the fraternity but they will come up with the right answers and we hope we will be privileged to describe them in the pages of METAL FINISHING.

Nathaniel Hall

Manufacturing Name Plates

Etching, Anodizing and Plating Operations

By R. E. Pettit, *Chicago Thrift-Etching Corp.*

THE merger of the *Etching Company of America* and the *Chicago Thrift Company* in January, 1951, resulting in the birth of the *Chicago Thrift-Etching Corporation* (a wholly owned subsidiary of Dodge Mfg. Corp., Mishawaka, Ind.), brought together an array of talent, experts in the field of printing, art work, etching, organic finishing, plating, anodic coating, metal fabrication, die design, etc., unsurpassed in the specialized fields of manufacture followed by the corporation.

The management, realizing the value of diversification, operates three interrelated manufacturing lines. The largest one is the manufacture of etched metal products, dials, scales, rules, identification plates and small etched metal stampings. The second phase of the business is the manufacture of small coin savings banks in plastic, brass and aluminum. These coin savings banks are furnished to large financial institutions throughout the country, and they are in turn distributed to the banks' savings department depositors. Last but not least is the commercial metal finishing department where sulfuric acid anodizing of aluminum and its alloys is carried out.

While each manufacturing line has its own particular product and activity, the anodizing and plating department finishes metal goods for the etched metal products units in dyed oxide and various electroplated finishes, such as chromium, nickel, copper and silver. The etched metal products line fulfills the name plate requirements of the bank division.

The manufacture of etched metal products is an art and careful attention to every detail with exacting skill is required. From the customer's specifications, skilled artists prepare the drawing of what will eventually become the copy matter on the identification plate, the scale, the dial, or possibly the light metal stamping. The completed drawing is then reduced to the specified size by photography and the glass negative is then checked and retouched, if necessary.

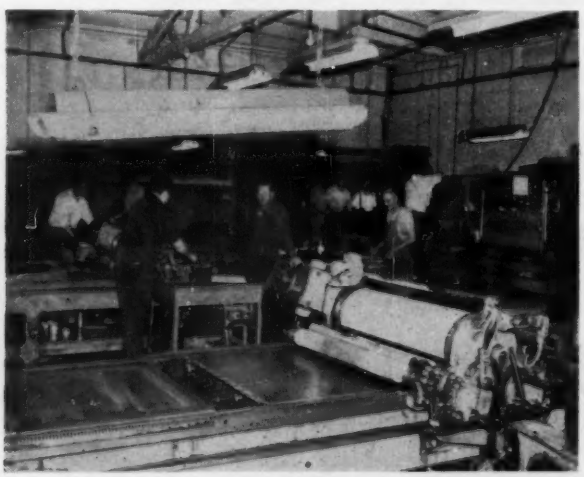

Figure 1. Printing metal sheets prior to applying resist.

Figure 2. View of buffing department.

Before the actual manufacture of the name plate can be started, the master zinc pressplate must be made. Using chemically prepared zinc plates, the image from the glass negative is reproduced upon the zinc "master" plate. The "master" pressplate, due to its photochemically prepared surface, will hold ink in the desired areas and will repel ink from all other areas. Thus, properly set up on the printing press and properly inked, it allows an accurate transfer of the image from its surface to the blanket printing roll of the printing press which, in turn, transfer the image to the surface of the metal, the first step in the manufacture of an etched metal identification plate.

While the art work, the photographic work and the work involving the preparation of the "master" zinc plate is in progress, the sheet metal (brass, bronze, aluminum, stainless steel, zinc, silver, nickel silver, etc.) is routed from the stock cutting department to the buffing department. Here, the required finish in accordance to the customer's specification is applied, under the direction of *Bill Schabow*, who heads the buffing department.

For some jobs the stock is received cut to size and

the finish applied manually on a standard buffing lathe. Other jobs lend themselves to surface preparation before shearing to size. These large sheets are either semi-automatically buffed or they are satin finished on a straight line automatic. In the case of the former, a 16″ loose section buff with spacers, making up a 14″ wheel face, is employed. The buffing wheel has a speed of 2500 rpm. and a 2″ oscillating motion. A speed of 4′ per minute is maintained by the sheet. Tripoli buffing compound is applied across the wheel face with a manually operated applicator.

The straightaway polishing machine is used for the satin finishing of sheets, which is accomplished with abrasive belts from 80 to 400 grit, with or without lubrication. The aluminum, brass and stainless steel sheets, etc., are handled by this machine at speeds ranging from 20′ to 60′ a minute. Aluminum extrusions and other wide items up to 4″ may also be polished on the machine.

Upon completion of the surface preparation work, the sheets may pass to the plating department for electroplating or to the anodic oxidation unit, or the prepared metal may go directly to the printing de-

Figure 3. Belt polishing machine.

partment where the actual manufacture of the etched metal product takes form.

In this department the design is lithograph printed upon the metal sheet surface. To further protect the inked design areas from the subsequent etching operation, the still tacky inked surface is dusted with a suitable "resist" powder which adhere to the ink, but it is readily removed from the uninked areas. Before the resist, generally an asphaltum base, will exclude the action of the etchant it must first be fused under a high heat, thus producing an impervious covering on those metal surfaces that will form the highlight on the etched product. The sheet is now ready for etching.

The earliest known chemical etching on metal was made on iron in 1513 by the Swiss artist, Urs Graf, and within the next fifteen years the practice of chemical etching became common. From the hand labors of the early masters to the modern technique employed in the commercial manufacture of etched metal goods is a period of procedure refinement through technical advancements. Basically, the principals of chemical etching, as practiced by the old masters, remains unchanged today. It has only been refined to meet the demands of today's requirements of mass production,

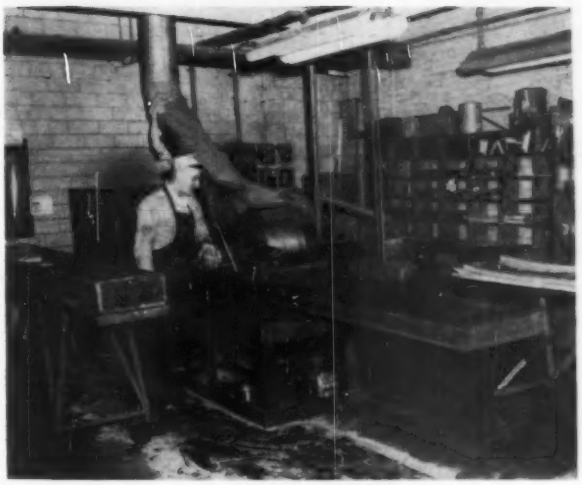

Figure 4. Semi-automatic sheet buffing machine.

serviceability and cost. Many etched jobs are produced to specification with respect to depth and width of etch, a tribute to the skill of the modern etcher.

Chemical etching as practiced by the early masters was one thing — the close tolerance etching as required by many commercial jobs of today is another. To meet these requirements and other specifications speaks well of *Casey Jablonski*, supervisor of the etching department. Mr. Jablonski comes from the "old school" of etchers, trained in Europe.

Commercial etching may be accomplished by chemical immersion or by electrolytic methods. In either case the etchant is selected because of its chemical affinity for the metal to be etched, as well as its effect upon the resist. In the commercial etching industry a wide variety of agents are used and the selection of an etchant is governed by the type of metal that is to be etched. The copper bearing alloys (brasses and bronzes) are most commonly "still etched." The printed and "burnt in" sheets are placed in wooden racks or fixtures and etched in the vertical position. Prior to etching, the prepared sheets are touched up to repair any slight break in the resist. The touch up material consists of an asphaltum base paint. This type of metal is etched in ferric chloride solutions contained in a ceramic tank. Air agitation of etching solutions is necessary and should be sufficiently adequate to dissipate the heat that is generated during the etching reaction. A greater uniformity of etch is thus obtained because localized heating is eliminated.

Stainless steels may also be etched by the "still" method employing the ferric chloride solution, although they are more difficult to etch. Electrolytic etching of stainless steel is undertaken in a ferric chloride solution employing reverse current with a line potential of 4-6 volts and carbon plates serve as cathodes. Because of the inherent difficulty in the etching of stainless steel, the preceding operation, that of burning in the resist, plays a critical part in the successful etching of the metal. The resist must be of greater density and the adhesion of the resist to the metal more perfect if breakdown of the resist during the more drastic etching action is to be avoided.

Cold rolled steels or similar steels are etched in solutions of nitric acid under conditions similar to those used in the etching of stainless steel. However, the

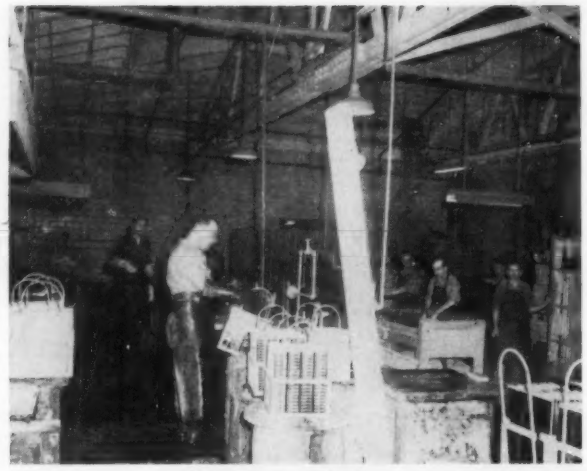

Figure 5. Etching room.

resist problems confronted in the etching of steel are not as critical as in the case of the etching of stainless steel.

Aluminum and its alloys are generally etched in muriatic acid solutions to start the etch and to carry the etch to the approximate desired depth. Sometimes, depending upon the job, the muriatic acid etchant will carry a quantity of sodium chloride in the solution. This salt has the property of helping to smooth out the resultant etch and to compensate for minor localized temperature variations. Following the muriatic acid etch the work may be finished off in a aqueous solution of hydrofluoric acid.

In the manufacture of the processed aluminum identification plate, hydrofluoric acid solutions are used to remove the anodically formed aluminum oxide films subsequent to additional Alumilite processing.

The muriatic acid solution is contained in a pitch lined wooden tank equipped with a graphite heat exchanger or cooling coil. The circulation of cold water through the coil helps to carry away the heat generated during the etching operation and thus insures a more uniform etchant action. A pitch lined wooden tank is also used for the hydrofluoric acid etchant. Because of the less violent action between aluminum and its alloys and hydrofluoric acid, this tank is not equipped with a cooling coil.

Silver generally is electrolytically etched, employing

Figure 6. Scraping department.

reverse current at a line potential of 2-3 volts. The work is made anodic in a nitric acid, potassium or sodium dichromatic solution, held in a ceramic tank. Stainless steel cathodes are employed. A similar solution, varying somewhat in concentration, may also be used to etch silver by the "still" tank methods. A modification of the potassium dichromate solution is used in the etching of zinc. Such additions as nitric acid or sulphuric acid may be employed. The etching bath is contained in a ceramic tank.

The art of chemical etching of metals is an exacting procedure and one that requires cleanliness. Any soil or foreign material on the surface to be etched will interfere with the action of the etchant. All etching is carried out with solutions operated at room temperature and sufficiently agitated to eliminate local heating.

Upon completion of the etching operation, the metal sheets are carefully and thoroughly washed in clean water, cleaned up in a potassium dichromate solution, water rinsed and then dried in sawdust. Some jobs call for special chemical oxidized effects in the background. Such effects are produced through the use of the commonly employed solutions of liver of sulphur, ammonium salts and other chemicals well known throughout

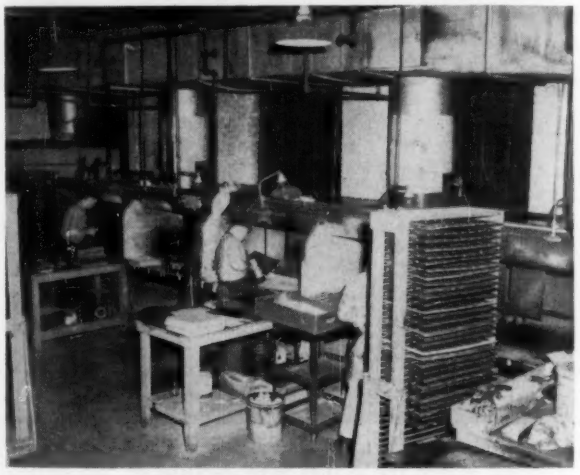

Figure 7. Enamelling section.

the plating industry. The oxidized effects, chemically reduced, may be relieved as required by slight abrasive action through the use of a soft wheel, or by hand rubbing with a very fine abrasive.

Through the medium of enamels, lacquer and oxidation processes, either chemical or electrochemical in character, various surface contrasting effects are produced. The enameling department will apply the various organic colors as specified, using either air dry or force dry materials. One-color plates are coated over the entire surface, while jobs calling for two or more colors are finished with the aid of metal stencils. Other orders may call for chromium plating, silver plating or anodizing, in which case these jobs will go to the respective department directly from the etching department or the enameling department for the specified finish.

As the manufacture of an etched metal product is followed through the several departments — printing, etching, enameling, and anodic treatment or electroplating — it will be seen that the plates or sheets of metal with a number of plates printed and etched

thereon may be completely covered with an organic coating or partially covered with a resist.

The functional operation of the next department — the scraping department — is to remove the organic coating or the resist from those surface areas of the plate on which, when so exposed, the underlying finish is brought out, thus completing the color or the surface finish scheme of the design. The removal of these substances from the proper areas is accomplished through the use of suitable organic solvents and mechanical scraping operations employing scrapers of various materials and textures.

The actual operations required to prepare the metal surface with the desired surface texture, and the application of several colors, is not as simple as one may gather. Some plates require two, three, or even four or more printings, of close and accurate registration, necessitating additional etching, plating and other treatments and, before these operations can be accomplished, the entire job must be laid out, as done by any builder of good merchandise, a function of the art department and the production department. Upon the removal of the excess surface coatings the plates or sheets of plates are carefully further washed and dried.

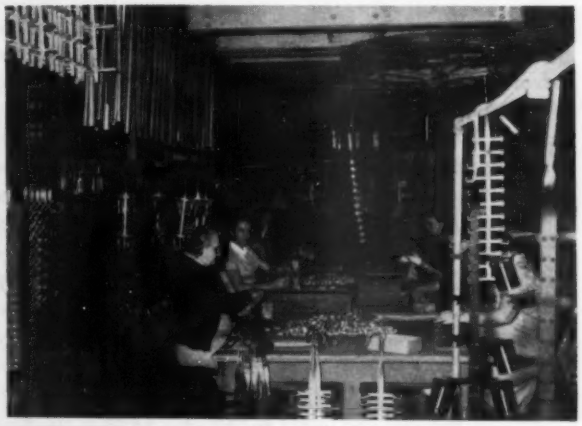

Figure 8. Racking work for anodizing.

The etching business is unique in that the machining, forming, piercing or shearing operations are carried out on the finished product — that is, after the product has been buffed, printed, etched, anodized, electroplated, enamel filled or lacquered and cleaned or scraped. One must realize that by now the etched metal product, nearing its completion, represents a considerable labor investment. Hence, extreme care and supervision must be exercised in the final machine operations to avoid spoilage.

Normally, from the scraping room the plates are sent to the machine shop for the final work. This work may involve shearing, piercing of holes, blanking, forming, and other types of machine operations as required to complete the product. To expedite the manufacture of etched metal products and to increase efficiency, the etched identification plates are handled in sheet form and there may be as many as 100 individual plates on a sheet. Large panels are handled individually. Thus, it becomes the function of the machine shop to cut these large sheets into strips from which the individual plates are finished as dictated

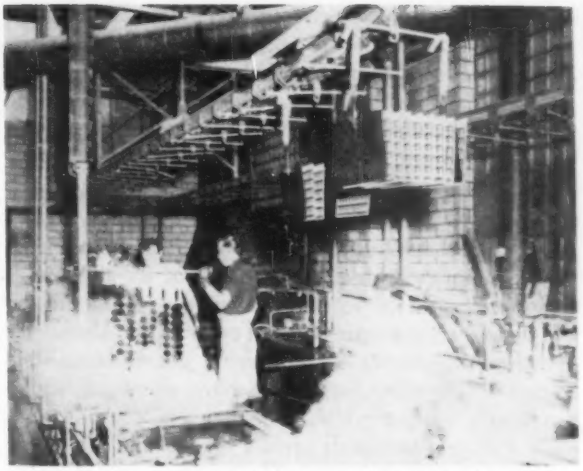

Figure 9. One corner of plating room. Note overhead conveyor.

by the customer's specification. These operations are carried out along four lines of punch presses, with a supplementary line of kick presses and an assortment of punch presses. Thus, the finished plates from the punch presses slide down a chute to the conveyor belt, which carries them to an inspection station. Other plates are caught in trays behind the press and are then transferred to another section of the inspection department. The packing and shipping of the plates follows the inspection.

The second phase of the business organization deals with the job shop operation of anodizing and dyeing aluminum and its alloys. Here, the anodized aluminum identification plate is processed in a wide variety of plain or colored finishes, in addition to the many types of fabricated aluminum products ranging from minute rivets, or other small articles, to church window frames or 30-foot extruded sections.

The racked commercial work is transported through the various treatments comprising the process by an overhead conveyor hoist. The smaller commercial articles, particularly those receiving the colored finishes, are racked at a central racking table, hung on an overhead conveyor chain, by which they are carried to the processing line for treatment, and then returned to the unracking table on the same conveyor, first passing through an infrared drying oven.

There are a number of factors involved in anodizing,

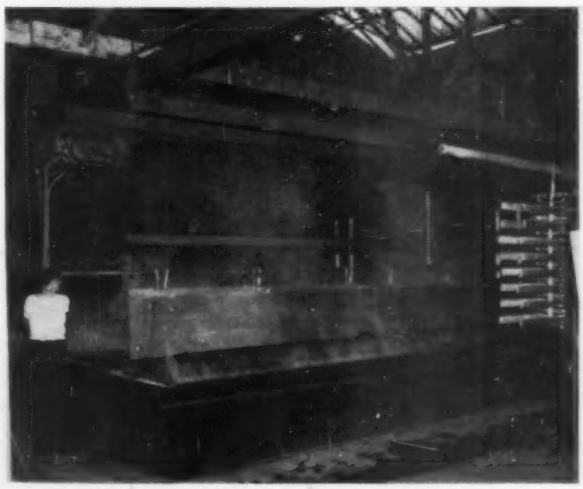

Figure 10. Anodizing installation for large sheets.

all of which require careful and accurate control if the desired properties of the plain oxide coating, or the desired shade of color of the dyed coating, are to be developed. These variables comprise current density, voltage, time, temperature, pH, electrolyte concentration, dye concentration, etc.

Aluminum may be anodically coated in a number of electrolytes, but the Alumilite process specifically refers to the sulphuric acid method, which has been widely adopted by industry because of its all around performance. The process is applicable to all aluminum alloys, but the structure and the color of the aluminum oxide coating varies with alloying constituents. The natural color, when formed on pure aluminum sheet, is a pearly opaque white. Copper gives a yellow cast while magnesium silicide gives a bluish tone. This process produces what is probably the most useful finish for aluminum.

The type of coating ranges from an extremely hard, dense and corrosion resisting film to the more absorptive coating which is readily dyed or colored in much the same manner as a textile manufacturer colors cloth. Thicknesses of oxide coating will range from .0005″ to 0.0008″, depending upon the type of intended surface or the required color for the part. The stability of the required coating is also an advantage. It will not char or emit gases when overheated.

The dyed anodic coatings offer unusual combinations in color. The natural sheen of the underlying metal striking through the colored oxide coating presents a surface appearance not matched by organic materials. Applications for these coatings are limited because of the fading tendencies of organic dyes, an inherent characteristic of these materials. Although wholly satisfactory for interior applications, the action of strong sunlight upon the dyes limits their use outdoors.

As a base for paints or lacquers it is unsurpassed. Organic coatings applied to the anodic coating give greater adhesion and protection than when applied directly to a grease-free aluminum surface. Anodized aluminum can be formed if the operation is not severe. "Crazing" develops when the oxide coating is materially deformed.

The "behind the scene" equipment for the production of the finish comprises electrical generating equip-

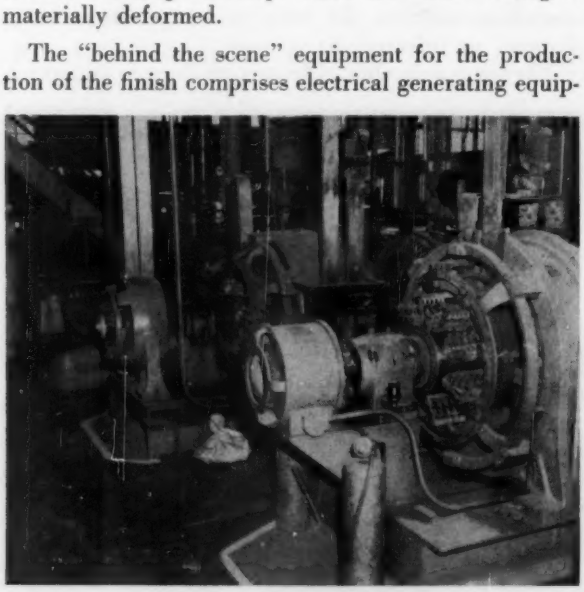

Figure 11. Generator room.

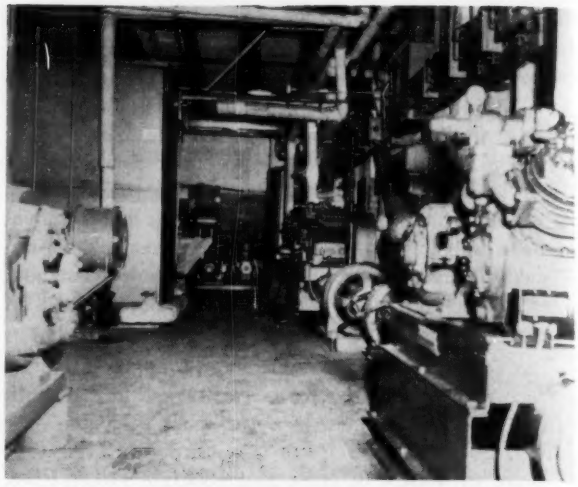

Figure 12. Refrigerator compressors for cooling anodizing solutions.

ment of 10,000-amperes capacity. The electrochemical formation of the oxide coating generates heat and this heat must be dissipated. To accomplish this a cooling system, comprising 45 tons of refrigeration compressors and a million btu. ice cells, is in operation. The entire system is thermostatically controlled, thus insuring a temperature control of plus or minus 2°F.

The processing tanks for the plain oxide coatings and for the dichromate sealed coatings for maximum corrosion resistance are 32′ long, 3′ wide, by 5′ in depth. The tanks on the color line are somewhat smaller. Those tanks that are operated at elevated temperatures are heated, in the case of the large unit, by means of individually fired and thermostatically controlled gas burners. Smaller tanks are heated by steam from a centrally located gas-fired steam generator.

Other aluminum finishing facilities include the chromate conversion type treatments, aluminum bright dipping and various finishes for magnesium.

The sulphuric acid solutions (15% and 25%) used in the anodizing process are held in lead lined wooden tanks, the thermostatically controlled 45-ton refrigeration system maintaining the proper operating temperature of the three processing tanks.

Auxiliary tanks are of metal construction. The several alkaline cleaner tanks are of welded steel construction. The rinse tanks are also of welded steel construction, including the potassium dichromate sealing tank. The hot water sealing tank is of welded steel construction, lined with stainless steel, and equipped with stainless steel heating tubes.

Dye or color tanks are of either metal or wood construction, also lined with stainless steel, and equipped with stainless steel steam heating coils. Other tanks, such as those for the aluminum bright dip, are stainless steel with stainless steel heating coils. The chromic sulphuric acid pickle is lead lined with lead heating coils, while the various conversion coating solutions are contained in steel tanks with steel steam heating coils.

The electroplating department, which functions with the anodic oxidation processing under the skillful

(*Concluded on page* 81)

Water Impurities and Electroplating

By James Boyd Smith, *Research Chemical Engineer, The Permutit Company, New York, N. Y.*

This is the second and final installment of Mr. Smith's article. The first part appeared on page 69 of our February issue.—Ed.

Insolubles Should Be Filtered Out

ONCE the bed is dirty, it will not function properly as an ion exchanger and channeling of the flow, low capacities, and poor effluent quality will be experienced. It is best, therefore, if the turbidity in the water is above 5-10 parts per million, to install a filter or other equipment to remove it.

Rapid sand filters, such as might be used in such a case, resemble zeolite softeners to some extent in that they consist of a bed of sand in a tank down through which water is made to flow. The water is introduced at the top of the tank through a distributor system and flows through a graded bed, containing about 0.5 millimeter diameter sand on top and increasing in size to the water collector system in the bottom. Suspended matter and turbidity are caught in the top couple of inches of sand. The process involved is somewhat more complex and effective than simple straining. When the pressure drop through the filter becomes excessive, the filter is backwashed exactly the same as a zeolite softener to remove the dirt.

When filtering a water which has not had any pretreatment a small amount of alum (aluminum sulfate) is frequently added to increase the effectiveness of filtration. The aluminum salt hydrolyzes to form $Al(OH)_3$ which, in turn, forms a flocculent precipitate when the pH is adjusted to the proper value. This precipitate helps to entrap suspended matter and turbidity, adsorb colored materials and organic matter, and destabilize colloids. Undissolved ferric compounds can also be removed by this means since they form a precipitate similar to the aluminum salt. In fact, one of the best process for removing even dissolved ferrous iron is to oxidize it by some means such as aeration and then filter it out in the undissolved ferric form. The troubles caused by slugs of rusty water, due to water main and pipe corrosion, can also be corrected by this type of treatment.

If the amount of turbidity or suspended matter is too high for a filter, as a general rule over 20 or 30 ppm, then the water should be pretreated by some other means. This can be a sludge blanket, or solids contact type of upflow equipment. Such equipment provides about one hour retention time, i.e., it must hold about one hour's amount of flow. As is sometimes done before filtering, alum or a ferric salt (called "coagulants") are added to the incoming water and the pH is then adjusted to the proper value. Under proper agitation a flocculent precipitate of $Al(OH)_3$ forms. This coagulant, as when fed to filters, helps to destabilize any colloidal particles, so they will settle out, hastens the setting of the turbidity, and produces a clearer treated water. The water then flows up through an expanding section. As the velocity drops in the expanding section the floc settles out and forms a "sludge blanket" as shown in Figure 5. This "blanket" aids in producing better clarification and provides a body of sludge for added absorption. In addition, the presence of the already formed sludge in both the blanket and in the precipitating zone, helps in many cases to produce a better floc, by apparently nucleating precipitation. Figure 6 illustrates a small precipitation installation.

It is also possible to carry out the above process, which is termed coagulation, in a large tank called a conventional settling basin. The retention time in such an apparatus must be three or four hours. The floc is removed by simply flowing the water slowly enough through the basin for it to settle out. Water from either a sludge blanket or conventional basin should be filtered to remove the last traces of floc, although the water from the sludge blanket type is usually clearer.

Such equipment is termed a "coagulator" or "coagulation basin" and, when used in conjunction with filters, will remove not only suspended matter, turbidity and iron but some of the dissolved organic matter and more complex inorganic ions as well. The removal of the latter, dissolved, substances is an adsorptive effect and is not necessarily complete, or effective against all forms of such materials although it is interesting to note that over 90% bacterial removal may be obtained on polluted waters with such equipment.

It will be noted that the above application of settling basins is largely to untreated surface waters (rivers mainly), since city waters very seldom have turbidity contents requiring more than filtration. Organic matter in city supplies likewise is not frequently significant but, when it is, coagulation plus chlorination may be employed. The basin not only settles the water but provides contact time between the water and the chlorine to allow complete oxidation of the organic matter by the free chlorine.

It is necessary in such a process to add a considerable excess of chlorine, say several parts per million, to make sure that the reaction is complete. The sand filters following the coagulation are then followed by activated carbon filters to remove the excess chlorine.

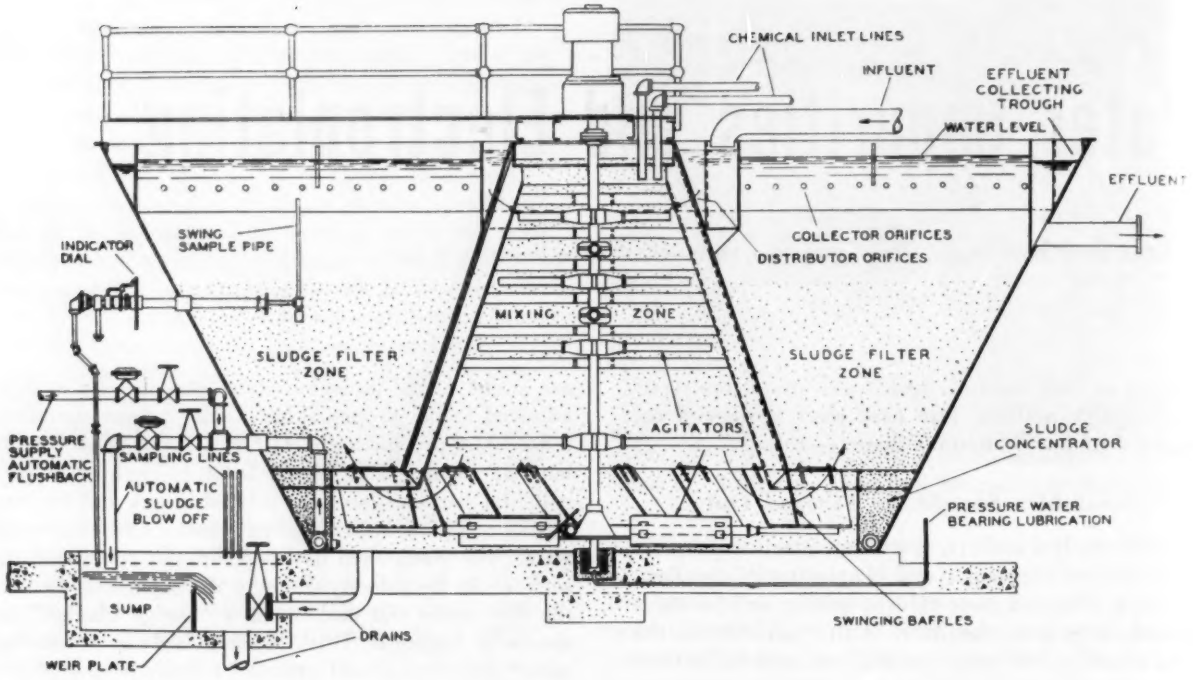

Figure 5. Basic diagram and design of vertical precipitator showing essential features of operation, the downflow mixing zone and the upflow filter zone. This unit is a round tank.

These filters resemble sand filters except that they contain activated carbon granules about 1 to ½ millimeter in diameter similar to those used in gas masks. The carbon used, however, is specially designed for water treatment and possesses great adsorptive properties for chlorine and other dissolved materials in water. The carbon is used on a "throw away" basis, since it has a long life. That is, it is discarded when it is exhausted, although it usually lasts a year or more. The filter must be backwashed from time to time to remove any dirt.

An activated carbon purifier will remove the chlorine and is also sometimes effective in removing organic matter. In this case the water is treated directly in the activated carbon filter without pretreatment. Any such application of activated carbon must be checked by actual operation on the water in question to ascertain whether the offending substance is removed or not.

Dissolved gases are not usually troublesome in plating operations. Air agitated baths and heated baths will lose any dissolved gases quite rapidly. Furthermore, the gases usually encountered in water: oxygen, nitrogen and carbon dioxide, are not of themselves usually objectionable. The one which is most apt to cause trouble, carbon dioxide, can be easily removed by stripping it from water with air. The air is either blown through a large tank of the water, called a decarbonation tank, or it is blown upward through a tower, packed with wood slats or Raschig ring packing, down which the water is being passed. Carbon dioxide is quite insoluble and is thus removed by the air. If it is necessary to remove oxygen and nitrogen as well as carbon dioxide, a vacuum deaerator can be used. This is a tank, also packed with slats or rings, which can be evacuated. The water is trickled down through it and the gases come out of solution because of the vacuum.

As mentioned, gases such as hydrogen sulfide are occasionally found in water. Most gases can be removed by the above physical processes. In the case of hydrogen sulfide, which might cause chemical trouble in plating baths by precipitating with the metals, the pH of the water should be down to around 6 to force the S^{--} anion into the undissociated H_2S form which is relatively insoluble and more easily removed by degasification. It should be kept in mind that there are alternate methods for gas removal, such as oxidation by chlorine for hydrogen sulfide.

All of these non-ion exchange processes are more fully described elsewhere.[47] They can, of course, be followed by demineralization to remove the ionized impurities. In fact, as mentioned, demineralization of a city water supply alone will usually provide an excellent water for plating. Usually demineralizers using weakly basic types of anion exchangers are preferred in plating installations.

The preceding information is intended to provide the plater with a reference guide which will assist him in detecting and curing troubles in his plating operations which may be caused by water-borne impurities. Effects caused by such impurities can be interrelated with other effects and are frequently complex. The advice of one skilled in these matters, such as a reliable consultant, is often invaluable. Once the offending impurity has been isolated and type of treatment is indicated, or if it is decided to install say a demineralizer to improve quality control, it is usually best to consult someone experienced in water treatment processes such as a consultant or a company manufacturing such equipment before deciding on a final choice.

Table I

The Effect of Various Impurities Which May Be Found in Water Supplies on Various Types of Plating Baths

NOTE: *Copper and other metallic elements which are only infrequently found in water supplies are included in places in this table because of their relatively serious effect on the bath in question rather than because they are classified as normal water impurities.*

BRASS PLATE, CYANIDE BATH

Iron—Bad.[23]

Carbonates—60-70 grams per liter limit.[23]

CADMIUM CYANIDE

Iron—Present as ferrocyanide at 4000 ppm causes hazy deposits; higher concentration worse.[13]

Copper—Copper may cause stains.[15] Copper may darken plate in bright dip and may reduce throwing power.[13]

Carbonate—Small amount is all right. Over 2-8 oz. per gallon, current density range for bright plate is restricted and drag-out losses are high.

Organic Matter—Can cause cloudy, dark or pitted deposit.[13]

CADMIUM FLUOBORATE

Chloride—Low chloride content in the water used to make up bath is required.[44]

Organic Matter—Can cause streakiness or bad color in plate.[44]

CHROMIUM BATHS

Magnesium—Magnesium sulfate reduces throwing power.[51]

Sodium—Sodium sulfate reduces throwing power.[51]

Iron—Iron sulfate reduces throwing power.[51] Iron in concentrations of 3 parts per million to 400 parts per million can increase covering power, but at 1500 to 2000 parts per million can give reduced covering.[59] Iron can cause poor conductivity in bath.[16,44,57]

Copper—Copper sulfate reduces throwing power.[51] It may cause trouble in high concentration.[66] Copper in nickel bath lowers salt spray resistance of chrome over nickel plate.[18] May reduce conductivity.[16,44]

Chloride—Can restrict plating range or cause roughness.[13]

Sulfate—The effect of the sulfate-chromate ratio is well known. It must be maintained at a proper value to produce satisfactory plate.[44,51] Water-borne sulfate obviously affects this ratio. It was not clear from reference 51 whether the above references to copper, iron, calcium and magnesium sulfates were directed towards the metals or the sulfate.

Nitrates—Can restrict the plating range and cause roughness.[13]

Organic Matter—Can reduce hexavalent chromium to trivalent.[13]

COBALT-NICKEL ALLOY PLATING

Iron—Upper limit 200 parts per million.

ACID COPPER BATH

Iron—Can cause roughness.[22] Can reduce cathode efficiency and affect the structure of the plate.[13]

Chloride—High concentrations can cause nodular deposits.[3,13]

Organic Matter—Can cause uneven deposits.[57]

AMINE COPPER BATH

Iron—Iron is objectionable.[44]

Organic Matter—Can be objectionable.[44]

CYANIDE COPPER BATH

Calcium and Magnesium—Both calcium and magnesium can precipitate in bath which can cause roughness and porous deposits. Low corrosion resistance can also result.[44]

Iron—0.5 gram of iron per liter is bad since it will precipitate as ferrocyanide.[13] Iron above 0.75 gram per liter can cause coarse crystalline plate, reduce anode efficiency and is hard to remove from bath.[44]

Carbonates—Carbonates should be kept between 2 and 8 ounces per gallon to prevent loss of anode efficiency (high carbonate) or attack of iron equipment (low carbonate).[44] Iron can cause roughness and loss of brightness in plate.[44]

Silica—Can cause spotty and dull deposits at 180° F.[13]

Organic Matter—Can cause streaks, ridges and burning;[13] can cause pitting and other defects.[44]

FLUOBORATE COPPER

Sodium and Potassium—⅔ gram per liter brightens plate and lowers limiting current density. Potassium may also cause precipitates.[67]

Iron and Manganese—Can lower limiting current density around 3 grams per liter.[67]

Chloride—Low chloride water should be used in making up the bath.[44,61]

Organic Matter—Can cause brittle plate.[44]

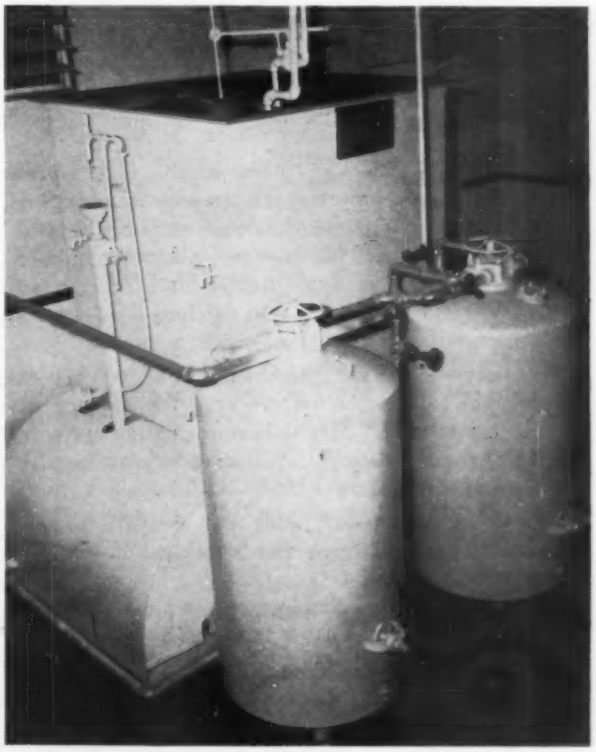

Figure 6. Small size precipitator of square type, treating about 10 gallons per minute. Appropriate filters are shown in the foreground.

Pyrophosphate Copper

Organic Matter—Oil can cause streakiness.[44]

Copper Refining

Chloride—Chloride upper limit is 10-50 parts per million.[63]

Cyanide Plating Baths in General

Calcium—Calcium carbonate is quite insoluble and can precipitate in cyanide baths affecting both the plate and causing scale on equipment.[33]

Iron—Sodium ferrocyanide may be formed and precipitate[14]. Ferric hydroxide may precipitate.[55]

Chloride—Chlorides may cause trouble but in some cases a limited amount is all right.[48]

Carbonate—Excessive carbonate impairs plating efficiency and can cause spongy deposits.[31,45,55]

Silica—Can impair plating efficiency.[45]

Gold Cyanide

Copper—Copper changes the color of the deposit.[65] Drag in of dirty water can be one of the main causes of contamination.[49]

Gold and Rhodium Baths

Water of distilled quality should be used due to the cost of the electrolyte.[3]

Iron Baths

Manganese—5 grams per liter upper limit but below this produces increased ductility.[60]

Copper—50 parts per million limit.[60]

Silica—Small amounts can cause pitting.[60]

Organic Matter—Undesirable but baths are not too sensitive to it.[5]

Lead Fluoborate

Sulfate—Can cause rough deposits and precipitates.[3,33]

Organic Matter—Can cause trouble.[13]

Nickel Sulfate

Calcium—Calcium is not objectionable if it is present in solution. If, however, the concentration exceeds the solubility a precipitate of calcium sulfate will result which is undesirable. This can cause poor corrosion resistance of plate, pitting, dulling and other troubles.[12,13,19,24,26,55] Solubility of calcium is about 300 parts per million in nickel baths.[13,66]

Magnesium—The same comments as above concerning calcium sulfate precipitates apply to any magnesium precipitates.[26,66] Magnesium in solution may give a softer, brighter plate.[12,13,19] It may increase conductivity and throwing power.[12,13]

Sodium—Some nickel baths are sensitive to sodium.[24] May cause hardness and brittleness of plate[13,26] and is undesirable.[12]

Potassium—Can cause hardness of plate and other troubles similar to sodium.[12,13,26]

Iron—Iron can cause pitting, streaking, burning, roughness, poor plates due to codepositing, over-stress in plate, poor adhesion, and brittleness.[13,15,19,26,43,44] Upper limits of iron in nickel baths are variously given 20 parts per million,[66] 40,[58] 50,[43] 100,[26] 100 to 200.[53] Iron is most troublesome in nickel baths and should be excluded as rigidly as possible.

Copper—Bright nickel baths are less tolerant to copper than are gray nickel baths since it causes darkness and roughness of the plate. Limits are variously given: 7 parts per million tolerable in bright bath, while 35 cause roughness and dark plate and 380 parts per million are tolerated in gray nickel bath.[19] Ten parts per million cause dullness, 10-25 decrease ductility, over 75 increases hardness and reduces corrosion resistance.[20] Ten to fifty parts per million and 40 are given as upper limits.[43,53] Copper can lower salt spray resistance.[18]

Manganese—Can cause rough deposits.[19]

Ammonium—Can cause hardness or cloudiness of plate.[13,26]

Aluminum—References[12,13] state that aluminum in solution has little effect although aluminum precipitates formed at higher pH are bad. References set upper limit of 50 parts per million[43,53] and state it may darken and embrittle plate.[19]

Nitrates—Nitrates may reduce throwing power and may increase hardness and cause cracking.[19] Pitting may also be experienced.[13] Adverse effects on additives may also be experienced.[26]

Phosphate—50 parts per million may cause a frosty deposit.[2] Darkening of plate may also be caused.[19]

Carbonates and Carbon Dioxide—Carbonates or bicarbonates at a pH of less than 4 are converted to carbon dioxide. Carbon dioxide can cause cracking, embrittlement, and impair cathode purity.[12,45]

Fluoride—Calcium fluoride is quite insoluble and precipitates of this compound are objectionable.[26]

Silica—Silica is only objectionable if it precipitates, since it causes pitting and other troubles.[15]

Organic Matter—Organic matter is another troublesome impurity in nickel baths. It can cause many troubles such as clouding, pitting and streaking.[12,15,19,26]

Dissolved Air—Not objectionable unless bubbles are formed on work which can cause pits.[12]

Hydrogen Sulfide—200 to 600 parts per million are all right, but larger amounts may darken plate and cause roughness.[19]

A general comment[44] is that bright nickel baths are quite critical, being troubled by traces of impurities such as 2 parts per million lead and 50 zinc.[53]

Nickel Fluoborate

Iron and Copper—The effects of iron or copper are similar to its effects in regular nickel baths but are not as large in the fluoborate bath.[62]

Chloride—One gram per liter causes pitting.[62]

Organic Matter—Causes pitting, burning, streaking.[62]

Rhodium Sulfate

Copper—Is objectionable.[38]

Silver Cyanide

Iron—Even slight amounts of iron stain deposits and higher concentrations are bad.[13] 300 parts per million are bad.[15]

Copper—Tolerated up to 2000 to 3000 parts per million but 7500 cause dark deposit.[13]

Chloride—Raw water chloride content should be less than 25 parts per million due to problem of corrosion.[15,52] High concentration of chlorides causes iridescent deposit.[13]

Carbonates—Excessive carbonate is bad.[22]

Organic Matter—Can cause dark, rough, streaky deposit.[13]

Acid Tin Bath

Chloride—High chlorides (15 to 20 grams per liter) give crystalline plate.[50] Chlorides are not desirable.[44]

Stannate Baths

Calcium and Magnesium—These cause precipitates with stannate which causes sludge and attendant troubles such as occlusion in plate plus loss of tin.[44]

Alkaline Tin-Zinc (Stannate-Cyanide) Baths

Calcium and Magnesium—Same troubles due to stannate precipitate as in tin bath, plus loss of tin and change in ratio of tin to zinc in bath.[44]

Zinc Cyanide

Copper—75 parts per million copper can cause poor appearance after bright dipping and can cause sludge.[13]

Chloride—Chloride can cause anode polarization[22,44] and lower efficiency.[45] Chloride can also cause corrosion problems.[44]

Carbonate—Excessive carbonate causes hardness and embrittlement.[45]

Zinc Sulfate Bath

Calcium—At around 700 parts per million calcium can cause roughness, treeing and nodules.[45]

Iron—Above 10 parts per million iron affects cathode deposit and lowers plating efficiency.[45]

Manganese—Manganese above 350 parts per million can cause roughness, nodules, treeing, etc.[45]

Aluminum Anodizing

Calcium—Objectionable in rinse and bath, where sulfuric acid bath is used due to calcium sulfate precipitate on finish.[26,45]

Iron, Copper and Manganese—All are objectionable in sealing bath.[27]

In addition the advantages of water treated by demineralizing[17,27] or zeolite softening[28] has been discussed. Better corrosion resistance when sealing is done in pure water rather than tap water is claimed.[17]

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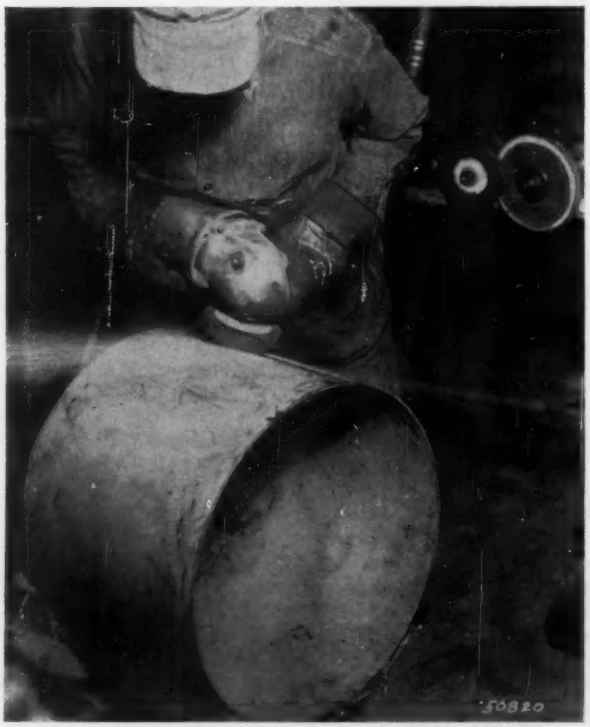
Surface Finishing the Stainless Steels

By Lester F. Spencer, Ch. Met., *Landers Frary & Clark, New Britain, Conn.*

Introduction

THAT classification of material known as 'the stainless steels' covers a wide range of chemical compositions, within which may be found an analysis for almost every purpose. The remarkable corrosion and heat resistance of these alloy types will vary with the total alloy content within the base compositions. In regard to corrosion resistance, this property is attributed to the formation of an oxide film on exposed surfaces; the stability and ease of formation being dependent upon the alloy content. Thus, under normal atmospheric conditions, a 12.0 percent chromium is considered as sufficient to maintain this protective oxide film.[5] A higher chromium content within the base metal is normally required when service conditions are less oxidizing. In those alloys that contain both chromium and nickel as major alloying elements, a higher degree of corrosion resistance is experienced, as compared to the straight chromium alloys; this being due to the greater stability of oxide film realized as a result of the presence of nickel.

As with any other class of material, successful working of the stainless steels is dependent upon both the characteristics and a knowledge of the properties of the material. Although suggested practices in finishing stainless will be given, it must be remembered that experimentation and trial is usually required to establish individual procedures. The prime purpose of a surface finishing procedure on this class of material is usually to obtain maximum corrosion resistance. However, other factors which may be of equal importance would include pleasing appearance for the consumer trade, or dimensional accuracy on machined parts.



(Courtesy Armco Steel Corp., Middletown, Ohio)

Figure 1. Grinding weld beads with rubber bonded wheel. This stainless steel cylinder is part of a drum for a flake ice machine.

By surface finishing, such operations as grinding, polishing and buffing are implied, and it may be in order to define these terms prior to a full discussion of the procedures utilized. Thus, grinding applies to rough finishing operations, using either solid or fabric wheels with coarse to medium abrasives either dry or with a liquid lubricant. The use of solid type wheels is often referred to as 'hard wheel grinding' and can be used in precision grinding for dimensional accuracy, removal of weld beads and protrusions on castings by portable equipment and the use of swing grinders to prepare surfaces of bars, billets or slabs. The use of a fabric wheel is confined to roughing operations on drawn or spun shapes, or for the removal of imperfections on sheet, strip or plate. In many instances, it is a preliminary operation for subsequent polishing and buffing operations.

Polishing, strictly speaking, is a cutting operation used to prepare the surface for final buffing. The amount of metal removal is usually less than that experienced in grinding; the number of polishing operations varying in accordance to the original surface condition of the part. Buffing follows polishing operations, producing a highly reflective surface free from scratches. This operation is frequently divided into a cutting down and a color buffing; each type using soft fabric wheels, a very fine abrasive and relatively high speeds.

Although standard equipment is used in the grinding, polishing and buffing of the stainless steels, the following characteristics of this class of material should be known,[2] thus:—(a) the stainless steels possess greater hardness and abrasion resistance than most carbon steels; (b) the stainless steels have less than half the thermal conductivity as compared to the carbon steels; and, (c) the austenitic types of stainless containing both chromium and nickel as alloying elements have approximately 40 percent higher coefficient of expansion than that displayed by the carbon steels.

The basic characteristics as given above will preclude established practices, which will differ to some

extent from that used in the surface finishing of other materials. Thus, both the increased hardness and abrasion resistance of this material type will normally result in a decreased amount of metal removal. The use of increased pressures, which may be the normal reaction to obtain higher rates of metal removal to the inexperienced workman, should be discouraged since overheating due to the low thermal conductivity of this material may result. This will produce a discoloration and, in extreme cases, may affect the corrosion resistance of the material.

The high coefficient of expansion coupled with the low thermal conductivity of the austenitic stainless steels will cause buckling and distortion if the work is overheated during surface finishing operations; this being especially true where the work is of relatively thin gage. Both the martensitic and the ferritic grades of stainless are at times difficult to polish due to their galling and scoring tendencies. Thus, in this instance, the surface of the polishing wheels tend to load and produce objectionable scratches. Therefore, it is usually recommended that the wheels be dressed frequently and that sufficient time be taken so as to produce the finish desired.

The problem of overheating cannot be over-emphasized. Localized over-heating is experienced where the grinding wheel is permitted to ride too long in a specific area; this being remedied by continual movement of the wheel over the area to be ground. Where parts have been submitted to operations which produce a scaling condition, subsequent grinding operations should be sufficiently deep so as to remove all traces of scale and decarburization. Any pits that may remain will undoubtedly contain oxide and will be potential foci of corrosion. An electrolytic action is very likely to occur in service which may spread over a wide area.

Grinding Operations

Rough grinding operations, such as is practiced in either the foundry or the mill, employ the floor and bench stand, the swing frame and the portable wheel type grinder. This type of grinding is seldom referred to as precision work; however it serves a purpose in the removal of objectionable scale, surface imperfections, protrusions, etc. The floor and bench stand grinders are sturdily built with wheels varying from 16 to 36 inches in diameter. Needless to state, a wide variety of grinder sizes are available and the choice will be governed by the type of work that is being done.

Swing frame grinders are used on moderately heavy work such as castings and in rolling mills for bloom and billet preparation. Wheel diameters, in this instance, will vary from 16 to 24 inches, and most machines are equipped with two speeds. Of wide usage is the portable grinder; this type of equipment being used in the removal of fins, parting lines, weld beads and surface imperfections. It is also used in grinding otherwise inaccessible spots on complicated castings. The most effective portable machines, as illustrated in Figs. 1 & 2, are those delivering the most horsepower per pound of weight. They usually use straight wheels up to 8 inches in diameter, cup wheels up to 6 inches in diameter, or a variety of small cones and mounted

(Courtesy Armco Steel Corp., Middletown, Ohio)

Figure 2. Portable electric disc sander; the operator is grinding down weld bead on piece of kitchen equipment.

points; the choice of which is dependent upon the particular job.

A recommended procedure for the removal of weld beads as suggested by Allegheny Ludlum[5] is as follows: "For initial grinding, it is customary to employ hard rubber or Bakelite bonded wheels. They should be free cutting so as to prevent loading. Where the original bead is fairly rough, it may be desirable to start with a roughing operation, using a hard wheel containing an aluminum oxide grit of approximately No. 20 to No. 24 size. Where it is desirable to dress the weld bead further, the second step would comprise a hard wheel containing an aluminum oxide grit of No. 40 to a No. 60, or even finer. This second step should be taken when the application involves final matching with a ground and polished sheet or plate surface."

Factors that should be observed in the removal of weld beads would consist of (a) avoidance of pressure to minimize such difficulties as warpage, distortion and overheating; (b) directional change between grits, whenever possible, so that grooving will be prevented; and, (c) proper selection of those physical constants such as diameter and width of wheel along with the weight factor. Hard wheel grinding slightly above the finished level is practiced where matching is desired. This practice will prevent a groove from forming along the bead when the matching operation is performed. As suggested by Allegheny Ludlum, stops or limiting lugs may be attached to the portable grinding machine on either side of the wheel to limit the cutting to a pre-determined point.

A precaution that should be observed in the grinding of the stainless steels is that selected wheels be reserved for the stainless steels. Thus, where this practice is not followed, difficulty from iron contamination may occur, with the resultant corrosion of embedded iron particles. In addition, as mentioned previously, frequent dressing of the wheel should be observed since sharp

corners and edges of the grinding wheel may cause deep scratches; this being especially true when the wheels are canted in operation. Maintenance of concentricity is important from the standpoint of vibration. Also, cleanliness of adjacent alloy surfaces during grinding may be insured by protecting them with a coating of glued on paper or other materials.[5]

Regardless of the grinding method that is to be employed, the possible wheel combinations may be quite confusing. Thus, those innumerable combinations involving such factors as abrasive types, bonding agents, grade, structure and grain size must be determined. In the grinding of the stainless steels, grinding wheel selection is limited due to the nature of the material. As a general rule, very hard and brittle materials require a relatively soft grade of grinding wheel since the softer grains will enable the worn, dull grains to break away and expose new sharp grains. As both hardness and brittleness of the material increases, a finer grain size or a denser structure is advisable. Soft, tough, ductile materials require a wheel with comparatively wide spacing of abrasive grains. This allows the grains to penetrate to a maximum depth and provides sufficient clearance for the relatively large chips which are removed.

The four constant factors which are considered in the selection of a proper wheel type would be (a) the material to be ground; (b) the amount of stock to be removed; (c) the area of contact or size of wheel; and (d) the type of grinding machine. Coarse grain size and open structure are necessary where stock removal is heavy. As the stock removal decreases and the finer types of finishes are required, the customary procedure would be toward finer grain size and closer spacings. Where the area of contact between the work and the wheel is small, a fine grain size along with a hard wheel and close grain size is usually recommended. On the other hand, where the area of contact is relatively large, a coarse grain along with a softer wheel and wide grain spacings is recommended.

There are other factors that may enter in grinding the stainless steels which would include wheel speed, work speed, condition of grinding machine and skill of the workman. In many instances, wheel types are derived by experimentation and, frequently, this would be repeated with every type machine under consideration. As mentioned previously, the advice of both the equipment and grinding wheel vendor should be obtained.

Finishing Operations on Fabricated Parts, Sheet and Strip

As is the case with many fabricators of consumer goods, Landers Frary & Clark utilize a wide variety of finishing operations on fabricated parts made from the stainless steels, the primary purpose of which is to improve the appearance of the item. The operational procedure that is followed will vary in accordance with the condition of the part; in many instances, a wheel roughing, polishing technique being required to remove surface defects. Thus, where drawn parts are submitted to interstage annealing, which has been followed by a suitable descaling process, a grease grinding operation is usually required to prepare the surface for subsequent polishing and buffing operations to the finish desired.

Two conditions will be discussed; the first will involve the use of shop-headed wheels, and second, factory coated abrasives. The former mentioned wheel type implies the development of the wheel by the fabricator, whereas the latter type material is purchased in the form of coated strips or belts. In considering the shop-headed wheel, the elements which are of importance would be (a) the wheel material; (b) the abrasive; and, (c) the bonding agent. The following types of wheels for shop heading have been recommended by Armco[2] as suitable for the grinding and polishing of the stainless steels, thus:

(a) *Canvas wheels* — Wheels made of canvas discs cemented or sewed together are excellent for heavy work with a coarse abrasive ranging from 24 to 46 grit.

(b) *Stitched Muslin Wheels* — Used widely for everything from coarse grinding to fine polishing. Usually bought assembled to size and width desired. However, some shops make their own wheels by gluing or cementing together standard buff sections to give the required width.

(c) *Solid Felt Wheels* — These are generally employed with 150 or finer grit for high polishes.

(d) *Compress Wheels* — Used when a formed

(Courtesy Armco Steel Corp., Middletown, Ohio)

Figure 3. Typical Finishing Room.

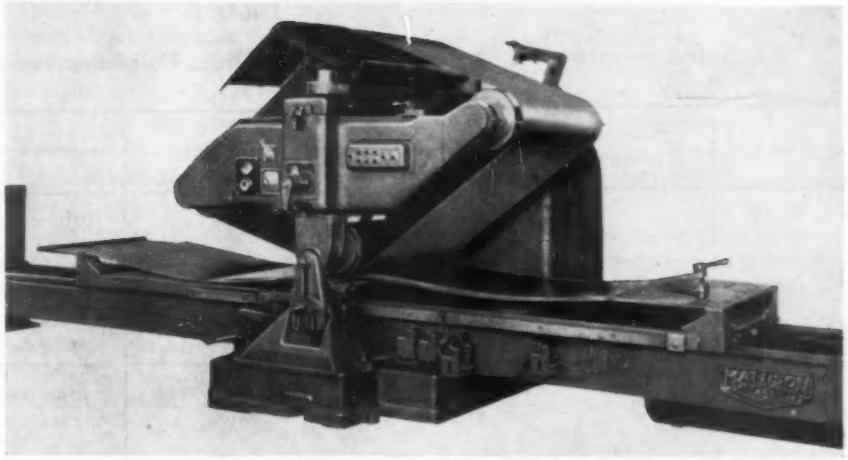


Figure 4. Wide belt sheet grinding and polishing machine.

(*Courtesy Mattison Machine Works, Rockford, Ill.*)

wheel face is necessary. They are also suited for most of the work done by the stitched muslin wheel. Wheel faces are usually made of rectangular blocks of leather, canvas, felt or walrus, radially compressed and assembled into steel side plates. The block construction permits accurate control of hardness or density of the wheel face. Moreover, the face will retain its shape when formed to fit the contour of the work because of the bias assembly of the segments.

A relatively new development in the metal finishing field is the increased use of both factory coated paper and cloth abrasive belts and strips. These are now used by many stainless steel fabricators for applications involving rough grinding to fine polishing. This material is used in the following manner, thus: (a) in paper or cloth strips applied to the face of special rubber contact wheels; (b) as endless cloth or paper belts, used with backstand idlers over cushion wheels on polishing lathes and swing grinders; (c) as endless abrasive belts used on hand block sanders. In this instance, the flexible wheel is replaced with a canvas faced curved hand block of cork; and (d) to surface various types of wheels and discs used on flexible shaft machines.

Factory coated abrasives have a number of advantages among which would be the following:

(a) They eliminate shop heading, which requires considerable equipment and experience.

(b) Factory coated abrasives have maximum uniformity and quality. In shop coating there is always the danger of mixing grits of different sizes. The introduction of even a few coarse grits may cause scratching of the metal and necessitates re-working of parts.

(c) An abrasive belt provides considerably more abrasive surface than either a wheel or a roll. Thus, a 10 inch abrasive wheel has a circumference of about 31½ inches. When this abrasive wheel is replaced with a resilient work wheel and back stand idler, endless abrasive belts of 84 to 168 inches long can ordinarily be employed. Consequently, the available abrasive surface has been made three to five times as long as when using the abrasive wheel. In addition, the belt also has a chance to cool in its travel around the work wheel and idler.

An example of the use of factory coated abrasive belts is the wide sheet grinding and polishing machine as illustrated in Fig. 4. This machine type is built in various sizes to finish sheets 36, 48, 60 and 70 inches in width; the length of the abrasive belt on all of the above sizes being 243 inches.

The abrasive that is ordinarily used in both grinding and polishing stainless steels is aluminum oxide; this material being generally preferred to silicon carbide due to its greater point endurance on materials possessing the high tensile strength of stainless. The choice of grain size will depend upon the prior condition of the part to be ground and the finish desired at that point. Suggested sequence of operations for grinding, polishing and buffing this material type is given in Table I.

The abrasives that are used for stainless should be uniform in composition, structure and size. In shop heading practices, these abrasives should be bonded securely to the wheel or belt. Good bonding requires high capillarity to allow easy wetting with the glue solution through surface treatment of the grain. Where various size grits are employed, they should be kept separate. In addition, abrasives must be clean and iron-free in order to prevent subsequent contamination of the items polished which could possibly impair their corrosion resistance. Natural emery is not recommended[2] for the grinding and polishing of the stainless steels; the artificial is more effective and free of iron content. In the finer grits, No. 150 or better, Turkish emery is said to be preferred since it doesn't scratch as deep and the next finer wheel will do a more perfect job.

Wheel preparation is of considerable importance since shop heading is still used to a considerable extent. Composite cloth wheels give the needed resilient backing to the abrasive grit, which has been glued to the wheel face. The stiffer the wheel the faster it will cut and, although softer wheels have a reduced cutting rate,[2] a finer finish is produced with the same grit. Such cloth wheels can be made by gluing or cementing sewed muslin buffs until the desired width face is obtained. These buff sections are usually ¼" in thickness, consisting of cloth sewed either by a spiral, concentric or radial stitching. The degree of resilience within the wheel can be regulated to some extent; the highest degree of resilience or stiffness being obtained by gluing the laminated discs in the entire area from hub to near the periphery. In addition, stiffness of wheel can be controlled by more frequent and closer sewings within the buff section. Usually, the finer and tighter the weave of cloth, the stiffer the buff and the longer is its life. For stainless wheels, buff sections with cloth thread count of 64/64 or 64/68 are recommended.[2]

Table I.

Suggested Sequence of Operations for Grinding, Polishing and Buffing the Stainless Steels

Finish*	Operation Sequence	Abrasive	Lubricant	Wheel		
				Type	Size**	Speed***
Welds		Abrasive Oxide Grit No. 40-60	Dry	Rubber or Bakelite Bonded	4-8	4000-6000
No. 1	1	Aluminum Oxide Grit No. 60-80	Tallow or Grease Stick	Shop Headed or Factory Coated Wheels or Belts	12-14S 5- 6P	6000-8000
No. 2D or No. 2B	2	Aluminum Oxide Grit No. 80-100	Tallow or Grease Stick	Shop Headed or Factory Coated Wheels or Belts	12-14S 5- 6P	6000-8000
No. 4	3	Aluminum Oxide Grit No. 150	Tallow or Grease Stick	Shop Headed or Factory Coated Wheels or Belts	12-14S 6P	6000-8000
No. 6	3B	Pumice, Lime or Silica Flour	Oil and/or Kerosene	Tampico Brush	8-16	2500-5000
	4	Aluminum Oxide Grit No. 180	Tallow or Grease Stick	Shop Headed or Factory Coated Wheels or Belts	12-14S 6P	6000-8000
No. 7	5	Aluminum Oxide Grit No. 240-280 Abrasive Stick		Buff	12-14S 6P	9000-10000
	5B	Stainless Buffing Compounds		Buff	12-14	7000-9000
No. 8	6	Aluminum Oxide Grit No. 320-400 Abrasive Stick		Buff	12-14S 6P	9000-10000
	6B	Stainless Buffing Compounds		Buff	12-14S 6- 8P	7000-9000
Scratch Free Mirror	7	Stainless Buffing Compounds		Buff	12-14S 6- 8P	7000-9000
	8	Stainless Buffing Rouge		Buff	12-14S 6- 8P	7000-9000

*Sequence of finishes which can be produced when starting with No. 1 pickled finish or No. 2D or No. 2B cold reduced finish.
**Wheel diameter in inches. ***Speed in surface feet per minute.

Note — Operations 3B, 5B and 6B are special steps to finish off at the respective No. 6, No. 7, and No. 8 finishes. When working through to a higher finish, B operations are not used. S = Wheel diameter for stationary machinery. P = Wheel diameter for portable machinery.

The effectiveness of the glue bond that holds the abrasive grain to its backing is of major importance. The bonding material acts like a tool post to hold the crystal cutting tool in place. A high quality animal hide glue is recommended. Bone glue, fish glue and cold glue preparations are relatively inefficient. Commercial silicate cements and other similar binders are being utilized successfully without heating. Suggested mixtures are given in Table II; these values being used for wheel speeds of approximately 7500 s.f.p.m. In the event that the speeds should be as high as 9000 s.f.p.m., the glue content within the mix should be increased by about 5 percent by weight to give a denser head.

Table II

Size of Aluminum Oxide Grain (Grit Number)	Percent Glue by Weight	Percent Water by Weight
24 to 36	50	50
46 to 54	45	55
60 to 70	40	60
80 to 90	35	65
100 to 120	33	67
150 to 180	30	70
220 to 140	25	75

Dissolving the glue by soaking in cold tap water is recommended; the time period being about one hour for ground glue and about 12 hours for flake glue. The batch volume should be limited to about a three hour supply; porcelain enameled ingot iron or stainless glue pots and water-jacketed heaters being recommended. The gluepot, brushes and other utensils that may be used should be kept clean and sterile so as to prevent bacteria growth and subsequent contamination of succeeding batches of glue. It is also recommended that a different brush be used for each grain size so as to prevent the possibility of mixing grits. The temperature of the glue upon application will vary. Thus, where both the wheels and grit are pre-heated, the glue is applied at a temperature of 140°F. For wheels and grits that are at room temperature, the glue is heated to a temperature of 160°F. This temperature factor should be controlled thermostatically and a thermometer should be kept in the glue pot as an added precaution.

In preparation of a wheel, it is recommended[2] that either one or two coats of a 5 to 10 percent glue sizing be applied hot to the preheated wheel face. After sizing, at least two coats of abrasive in glue will be necessary, drying carefully after each coat. In this latter step, the glue is applied to the face of the wheel and rolled in a trough of abrasive grit until it has picked up all the grain it can hold. The entire operation should be carried out as quickly as possible so as to minimize the jelling of the glue during set-up. Where preheated wheels and grits are employed, a recommended temperature is from 100 to 200°F. Light pressure is all that is required to obtain proper penetration of the grain in the glue coat. Thus, where the production of shop heads are relatively high, a uniformity of product is obtained by the use of power-driven wheel heading machines which exert controlled and measured pressures during rolling of the wheel. In addition, this equipment keeps the abrasive grains heated.

The drying operation consists of reducing the moisture content within the wheel to the point where greatest strength is realized; this value, in the case of hide glue, being given[2] at 10 to 12 percent. Under-dried wheels will cut slowly, glaze and overheat, whereas a wheel that has been overdried will be brittle and have short life. The following recommendations have been given as suggested procedure in drying shop headed wheels, thus: "Wheels are best dried or cured in a controlled-temperature drying room with an exhaust fan to speed up evaporation through air circulation. A temperature of 85 degrees and a humidity of 50 percent is ideal for drying. Other conditions that have been found satisfactory are (a) 75°F. at 45 percent relative humidity, and (b) 90°F. at 55 percent relative humidity." The drying time will depend upon the thickness of the wheel head which in turn is influenced by such factors as grain size, glue strength and number of coatings. Usually a 24 hour period is satisfactory for a one-coat abrasive wheel head, whereas a 48 hour drying period is used for a two coat wheel head.

Factory made stitched muslin as well as canvas or felt wheels come trued with nap laid back ready for sizing. However, shop built wheels must first be trued on the polishing lathe spindle with a commercial buff rake or a sharp cutting tool which may be made from an old file. In the truing operation the nap is laid back on the face of the wheel. In order to always keep this nap lying in the same direction, the wheel should be operated in the same direction as when trued. Painting an arrow on the side of the wheel after truing will indicate the correct direction of rotation and insure longest wheel life.

Built-up wheels should be balanced prior to use so as to minimize such difficulties as chatter, vibration, rumble, selective shedding of grains, etc. In addition, an unbalanced wheel usually requires frequent re-dressing. Static balancing is usually performed; the wheels being placed on a true arbor and mounted on a roller stand where it can rotate freely. Lead washers are employed on the light side to obtain this static balance. In some instances, balancing tubes which are in the pressed steel hub are provided, which offers anchorage of lead washers used for balancing. This is usually the case where leather and canvas faced wheels are obtained.

'Cracking of the wheel head' is also standard procedure prior to its entry into service; this usually being done by striking lightly with a round bar or pipe. Not only does this procedure give flexibility to the wheel head, but it also will indicate whether the wheel has been properly dried. The direction of the blow is diagonal at an angle of approximately 45 degrees; this being done at intervals along the entire circumference of the wheel. The same procedure is repeated from the other side of the wheel so as to produce an 'X' marking. Never use a sharp edge instrument for cracking since there is a danger of chipping the wheel head. Also, heavy blows may distort the wheel.

Re-heading of built-up wheels is possible until they become too small for use. The 'dry' method, which is usually preferred, consists essentially of two steps, namely: (a) a cleaning operation which would remove all the dirt and oil from the face of the wheel; and, (b) a dressing and truing operation where a Carborundum brick or a special carbide tool is employed in conjunction with a wheel dressing machine. In the latter operation, only enough of the head should be removed so as to obtain a clean base for re-heading. Depending upon the condition of the wheel, sizing may be required. The other steps in producing a wheel, as previously stated, will be the same. The 'wet' method consists primarily of removing the worn abrasive head by re-dissolving the glue into a water bath. This method is not suited to all types of wheels and requires an experienced operator.

A grease stick, which usually consists of a mixture of mutton tallow and stearic acid which is at least 50 percent saponifiable, is normally used as a lubricant. This type of lubricant is used at LF&C where fabricated items are to be polished. In the finishing of flat sheets, a liquid lubricant, such as a mixture of kerosene and machine oil, heavy machine oil or palm oil, is usually employed. The consistency of the lubricant, the frequency of application and the volume will depend, to a large extent, on the operator and the type of work shape to be polished.

In order to produce a highly lustrous and reflective finish, a buffing operation normally follows polishing. This operation, in many instances, can be sub-divided into a 'cutting down' and a 'color buffing.' The buffing

Table III

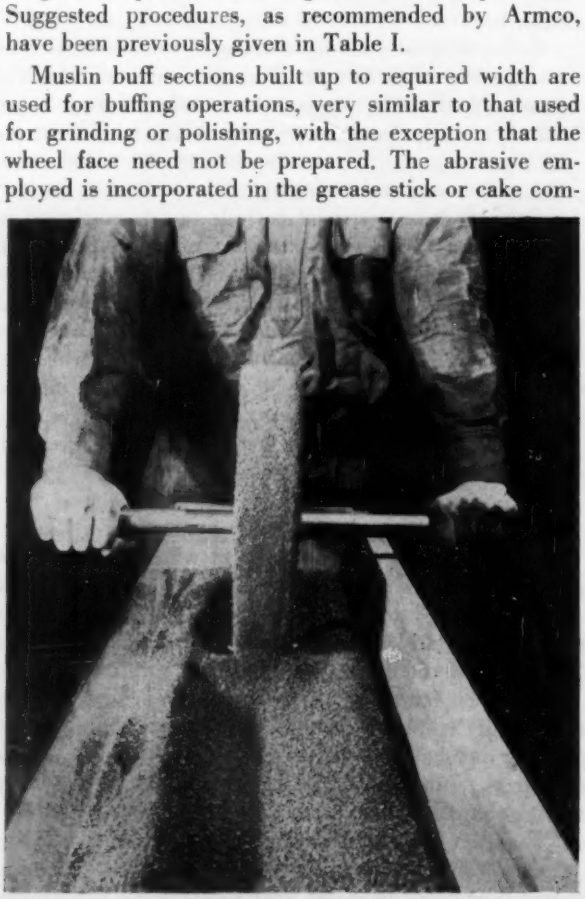
Special Polishing Procedures for the Stainless Steels[2]

Desired Finish	Starting Finish	Operation Sequence	Abrasive	Wheel		
				Type	Size	
	No. 1	1	Aluminum Oxide, Grit No. 60-80*	Shop Headed or Factory Coated Wheels or Belts	12-14S 5- 6P	6000-8000
No. 6		2	Aluminum Oxide Grit No. 100-120*	Shop Headed or Factory Coated Wheels or Belts	12-14S 5- 6P	6000-8000
or Satin		3	Satin Finishing Compound (Lea Compound** Grade 'B'	Sewed Buff	6 in.	5000-6000
		4	Learok, Grade 304-B	Loose Buff	6 in.	6000-8000
Removal of Heat Tints	Welding Heat Tints	1	Nu-Steel Paste or Liquid	Tampico Brush	8 in.	2400-3000
		2	Nu Steel Powder	Hand Clean with Flannel Cloth		
Wire Brush	No. 2D or No. 2B	1		Stainless Steel Brush		4000-6000

*Use grease stick lubricant. **Top dress with small amount of Learok Grade 304-B on the Lea Compound coating for lubrication.

operations usually follow the polishing with 240 grit or higher, and it should be remembered that minimum time for buffing can be realized only by careful planning of all operations leading to these final operations. Suggested procedures, as recommended by Armco, have been previously given in Table I.

Muslin buff sections built up to required width are used for buffing operations, very similar to that used for grinding or polishing, with the exception that the wheel face need not be prepared. The abrasive employed is incorporated in the grease stick or cake compound which is applied to the face of the wheel. The abrasive that is employed is a levigated alumina which, of necessity, must be iron free. For the highest possible finishes, a rouge composed of green chromic oxide (Cr_2O_3) should be used. In addition, buffing should not be attempted on a surface that is coarser than that obtained from either a No. 200 or a No. 220 grit used with proper lubricants.[1] As is the case with polishing lubricants, buffing compounds can be obtained in various forms from companies that specialize. In some cases, these compounds are made directly in the shop: the formulation being determined through years of experience.



(Courtesy Armco Steel Corp., Middletown, Ohio)

Figure 5. Rolling wheel in abrasive trough after applying glue.

Commercial buffs may range from a standard sewed type, as exemplified by the concentric, radial, radial arc, parallel and square sewed, to loose buffs with the layers of fabric sewed once around the arbor hole. The standard section is usually 20 plies of cloth; the recommended cloth count for buffing stainless steel[2] being 86/93. As in polishing, the face width of the buffing wheel is produced by placing buff sections together: the resilience of the wheel being regulated by placing cardboard spacers on the hub. Due to the high speeds experienced in buffing and the toughness of the material, the bias or 'special ventilated' type buff is the best to prevent scorching. Buffing wheels made from alternate plies of muslin and sisal which is a hemp product, resist scorching and have proven satisfactory on stainless steels. In a 'cutting down' operation, the efficiency of the operation is dependent upon the efficiency of collecting and holding the compound. This factor is in turn dependent upon both the type of cloth and the amount of stiffness obtained by the sewing or puckering of the buff ply. Usually the harder the buff, the faster the cut.

The speeds at which either 'cutting' or 'coloring' buffs are to be operated will vary with the shape of the

work. Thus, cutting should be done at a maximum of 10,000 s.f.p.m., whereas the speed for a color buff should be at a maximum of 9,000 s.f.p.m. Speeds in excess of 10,000 s.f.p.m. are hazardous in hand buffing odd shaped work pieces and, in addition, buff wear may be excessive. Where speeds are in excess of the values given, especially on constant speed machines, the diameter of the buff wheel can be changed to obtain recommended speeds.

Difficulties in buffing the stainless steels can be attributed to a number of factors among which would be: — (a) too soft a wheel; (b) imperfections in the wheel such as knots within the stitching; (c) too slow a surface speed; (d) an attempt to combine both 'cutting' and 'coloring' in one operation; (e) poor selection of buffing compound; (f) too much pressure applied during buffing; (g) buffing a surface which has not been properly prepared; and (h) too stiff a buff. Of interest, in regard to buffing with a hard buff, is the difficulty as per our experience in finishing type 440C stainless knife blades which had been previously hardened to a Rockwell of approximately C62. Apparently the buff wheel, which was about 8 inches in diameter and 5 feet in length, had a mixture of hard and soft buff plies. The result was that, during finishing, the harder buffs actually made a slight depression in certain areas within the blade. This was objectionable since this depression could be seen when light was reflected from the blade. Thus, the finish had a 'wavy' appearance.

As indicated in Table III, the polishing procedures to obtain special finishes, as given by Armco Steel, are tabulated. Wire brush finishing is practiced widely. However, it must be remembered that the brush material should be the same material as the material to be brushed. Thus, considerable difficulty, especially if it is on returned consumer goods, and embarrassment may be experienced when type 302 stainless items are returned due to rusting. This rusting is not due to the action of the stainless, but rather to the particles of embedded iron which may have come from the plain steel brush employed for wire brushing. Not only is it essential to use a stainless wire brush, it may be an excellent idea to passivate consumer items whenever possible before they are released to the consumer market.

Conclusion

The finishing of the stainless steels will not be difficult if the properties and individual characteristics of this material are known and respected. In general, the following practices may be of benefit, thus:

(a) In either polishing or buffing operations, do not increase wheel pressure to obtain shorter finishing time. This will lead to overheating. The same is true in grinding procedures; distortion and warpage resulting when too deep a cut is made.

(b) When a fresh abrasive wheel or belt is placed in production, the use of a scrap piece of material to break in the wheel is recommended.

(c) When changing from grit to grit, care should be taken to avoid mixing of grits. This is not only true in wheel preparation, but also where wheels containing various grit sizes are used. In the latter case, it is advisable to clean the work before proceeding to the next wheel having the finer grit.

(d) In polishing, the abrasive scratches should be straight and parallel. Herringbone scratches, gouges and chatter are averted by proper technique.

(e) Plan the polishing and buffing procedure carefully so that metal removed to finish desired is gradual. In the event of spot polishing, those areas which are not touched should be suitably protected by masking with adhesive paper.

(f) Do experimental work to determine the variables in the particular shop. Work can be done on determining the value of various grits, polishing compounds and buffing compounds. Work also can be done on procedures, methods of improvement of wheel preparation, etc.

(g) Do not hesitate to seek the advice of the various vendors where aid could be obtained. Thus, the steel vendor and those supplying either abrasives or polishing compounds can be consulted.

(Courtesy Armco Steel Corp., Middletown, Ohio)

Figure 6. Safety deposit box doors made from 430F stainless being buffed after the normal surface grinding operation.

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1. 'The Fabrication of U. S. S. Stainless Steels,' 1952 ed., United States Steel, Pittsburgh, Pa.
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Effects of Air Agitation In Sulfuric Acid Anodizing

By R. C. Spooner, *Aluminium Laboratories, West Kingston, Canada*

SULPHURIC acid anodizing of aluminum and its alloys depends upon numerous factors, among which the alloy composition, bath composition and concentration, bath temperature and current density are all of major importance. Another less important and generally non-discussed variable is the degree of agitation employed. Although agitation is required by some specifications (for example D.T.D.910C) its extent is not specified in quantitative terms. In commercial anodizing plants conditions vary from vigorous agitation to almost none at all.

Agitation of the anodizing bath may be produced by movement of the work, as in continuous anodizing of aluminum strip, or by movement of the electrolyte through stirring, pumping or by introducing air. Batch anodizing commonly employs air agitation because of its economy and simplicity and further references in this article will deal with this particular method.

Agitation is readily provided by the discharge of compressed air at 20-40 lb./in.^{2} through tiny holes drilled in lead tubing laid on the bottom or suspended on the sides of the anodizing tank. The air should be cleaned by filtering to remove oil and dirt.

The normal effects of air agitation are summarized briefly below under the headings of advantages and disadvantages:—

Advantages

1. Produces uniform bath temperature. Anodized work dyes to common color.
2. Produces uniform bath composition.

Disadvantages

1. May break electrical contact between work and rack, and require more costly racking technique.
2. Stirs up dirt particles and prevents settling as sludge on tank bottom.
3. Increases degree of noxious spray liberated during anodizing.
4. Increases the bath voltage required to obtain definite current density.
5. Decreases depth of color on dyeing.

Most of the points listed are self explanatory. Two of the disadvantages are less obvious, the effect of air agitation in first, increasing the bath voltage required to maintain a fixed anodizing current density and second, the decrease in depth of color on dyeing. The following experiments and their results illustrate more precisely the effect of agitation, particularly its relation to the temperature of the metal and its electrolyte film.

All anodizing was done in a 15 per cent by weight sulphuric acid solution employing direct current. Panels were prepared prior to anodizing by normal cleaning methods using a soak in an inhibited alkaline cleaner, followed by brief dips in a hot sodium hydroxide and a cold nitric acid solution. The panels (4 in. x 6 in. x 0.064 in.) were anodized in a 225 gal. semi-commercial anodizing tank with automatic temperature control of ± 0.5°C. about the set value. Aluminum alloy numbers refer to those employed by the Aluminium Limited Group of companies. The British Standard Specifications equivalents are as follows: 1S equivalent to S1B; 2S equivalent to S1C; 3S equivalent to N3; 24S similar to N14; 50S equivalent to H9. The Alumilite sheet employed is 3S clad on both sides with 99.7 per cent or better aluminum sheet.

Current Density

A panel of 1S (Al 99.50 per cent min.) was anodized at a constant bath potential of 18 volts in a sulphuric acid solution at 21°C. for 30 minutes. The extent of air agitation was varied at frequent intervals between four degrees of agitation, vigorous, moderate, light and none, each time for a period long enough to establish steady anodizing conditions, after which the current was read. The averaged results are listed in Table I.

Table I

Effect of Air Agitation on the Anodizing Current Density

Degree of Air Agitation	Approximate Rate of Air Flow (cu. ft./min./gal. of solution)	Current Density (amp./ft.^{2})
None	0.0	23.2
Light	0.07	19.6
Moderate	0.14	14.0
Vigorous	0.19	14.0

(1S, Constant bath voltage of 18 volts, 15 per cent sulphuric acid solution at 21°)

(Reprinted from Metal Industry, London)

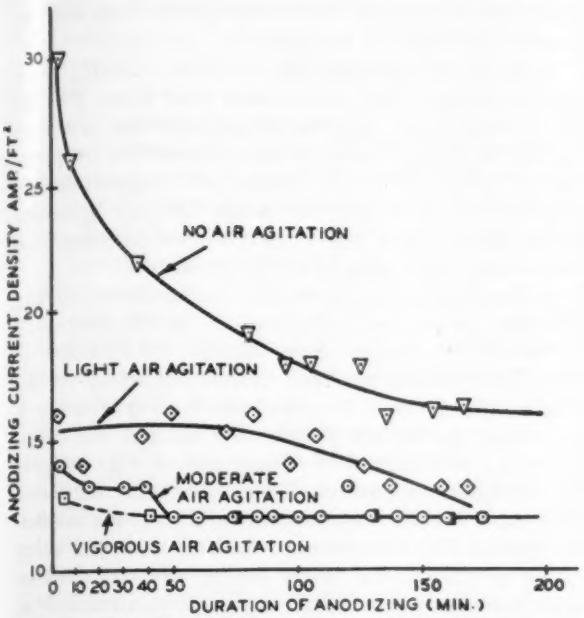


Figure 1. The effect of air agitation on the anodizing current density over a prolonged period.

(Alumilite panels, 15% sulphuric acid solution at 21°C. under a steady potential of 18 volts.)

The higher current density of the non-agitated solution fell rapidly as agitation began but once adequate stirring was provided there was no further decline.

In another experiment a panel of Alumilite sheet was anodized under similar conditions for a period of three hours to determine whether the air agitation effect changed or not as the anodic coating became thicker, on prolonged anodizing. The degree of agitation was altered every three to five minutes and the current density determined at the end of each period. The results are shown in Fig. 1.

With light or no agitation, the current density declined with lengthening anodizing time, but when moderate or vigorous air agitation was provided, there was only a slight initial fall, followed by constant values. During initial anodizing a moderate degree of agitation reduced the current density by about 50 per cent while towards the end of the anodizing period, the reduction was about 20 per cent.

In each of the above experiments all the results were obtained on the same panel. Thus the current density at any specific point and the degree of air agitation there employed was influenced to some extent by its previous history of film formation conditions. In other words the individual values were not obtained on films formed entirely with the degree of agitation listed. The spread in the values of Fig. 1 for none or light air agitation is due in part to this fact.

The effect of air agitation on anodizing current density and voltage relationships varies with the aluminum alloy. Values are shown in Fig. 2 for four alloys which were anodized at 15, 18 and 21 volts with and without air agitation and the current density noted. The effect of air agitation was relatively slight in all cases at 15 volts but steadily increased as voltage was raised. At 21 volts air agitation reduced the current density with super-purity aluminum and 50S to about one-third of the value with no agitation. A much smaller decrease was produced with 3S and 24S. The varying effect is due to the difference in the characteristics of the anodic films formed on the four alloys.

The effect of alloy composition on anodizing current density shown in Fig. 2 illustrates the well known fact that anodizing racks should be constructed from those alloys such as 24S which draw low current densities. This factor increases in importance as the voltage is increased to 18 or more volts and under conditions of no or very little agitation.

Film Thickness

Three sets of Alumilite sheet panels (three panels per set) were anodized as described above but with a constant degree of air agitation for 30 minutes. One set was prepared under each of the three air agitation conditions listed in Table II. The voltage was adjusted to produce in each case a steady current density of 15 amp./ft². After water sealing the film thicknesses were determined by metallographic examination of mounted and polished cross-sections.

Both the bath voltage and film thickness rose steadily with increasing agitation. The rise in thickness of about 15 per cent was slightly higher than the percentage increase in power consumption due to the higher bath voltage.

Table II

The Effect of Air Agitation on Bath Voltage and Anodic Film Thickness

Air Agitation	Bath Voltage Required (Volts)	Film Thickness (microns)
None	16.6	16.2
Light	16.9	17.5
Moderate	18.3	18.7

(Alumilite sheet anodized in 15 per cent sulphuric acid at 21°C. and 15 amp./ft.² for 30 min.)

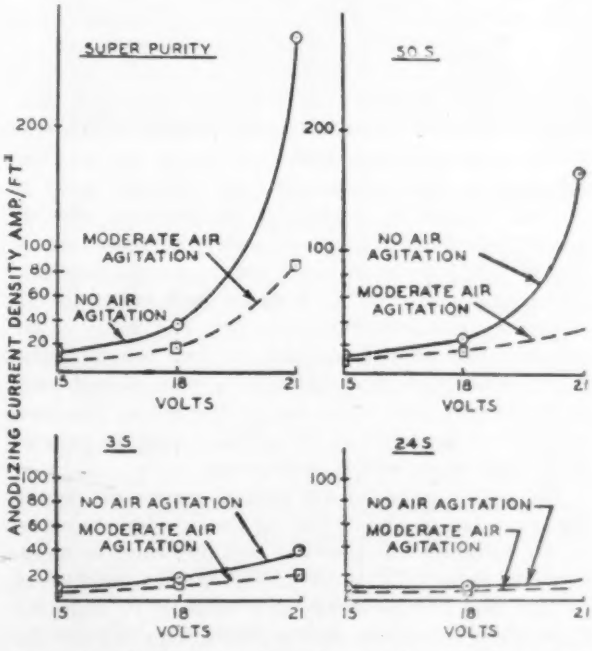


Figure 2. Effect of increasing voltage on the anodizing current density with and without moderate air agitation for super-purity aluminum, 3S, 24S and 50S.

(15 per cent sulphuric acid solution, 21° C.)

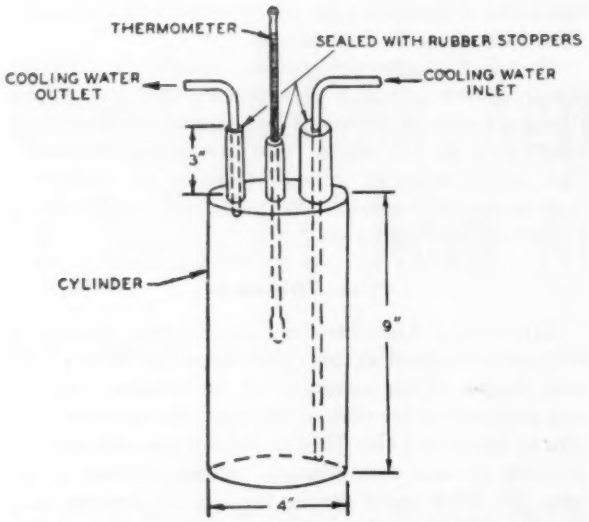


Figure 3. Aluminum (2S) cylinder provided with internal water cooling.

Anodizing Temperature

The bath voltage required in sulphuric acid anodizing varies considerably depending upon the conditions, particularly the electrolyte concentration and temperature and of course, the current density applied. Values of 12-18 volts are quite common. Much of this voltage drop is at the anode across the metal-solution interface, where it produces a localized heating effect. The following experiment was planned to obtain some information on this effect and its variation with air agitation. It is interesting that a brief search of the literature available did not reveal any experimental results on the local temperature and its variation with anodizing conditions.

A small cylinder shown in Fig. 3 was constructed from 0.041 in. 2S sheet. The three outlets were plugged with rubber stoppers carrying a thermometer and glass inlet and outlet water cooling tubes. Narrow aluminum foil strips were inserted in the two larger openings and forced tightly against the side of the holes by insertion of the rubber stoppers. The strips not only made electrical connection but also served to suspend the cylinder in the anodizing tank from the anode bar. The cylinder was filled to capacity with 1,850 ml. water at 20.5°C., cleaned by soaking in an inhibited alkaline cleaner and anodized without water circulation for a period of 48 minutes in 15 per cent by weight sulphuric acid maintained at 21°C. A steady bath voltage of 18 volts was maintained during the run. The degree of air agitation was altered regularly at four minute intervals. Four degrees of air agitation were employed, each being repated three times during the series. The temperature of the water in the cylinder and the current were noted at the end of each period.

The results obtained are plotted graphically in the upper portion of Fig. 4. During the first four minutes, no air agitation was provided and the water temperature rose from 20.5° to 24°C. The current density had by this time become steady at a value of 19 amp./ft.^{2} Light air agitation was next provided. This reduced the rate of temperature increase and lowered the current density. From this point on, the two curves, water temperature and current density, parallel each other very closely illustrating the manner in which both are related to the degree of air agitation.

Each time air agitation was eliminated (28-32, 40-44 minute periods) the temperature rose from 1.5° to 2.5°C. while when vigorous air agitation was provided (12-16, 24-28, and 44-48 minute periods) the temperature fell from 0.5° to 2°C. Moderate air agitation also caused a fall in temperature while light air agitation had a smaller effect and so increased or decreased the temperature depending upon the conditions.

Following this run the anodic coating formed on the cylinder was stripped by immersion in the customary hot phosphoric-chromic acid solution (A.S.T.M. B-137-45). The cylinder was then reanodized under conditions similar to those described above except that cooling water was circulated internally through the cylinder at a constant rate. The lower part of Fig. 4 shows the variation of current density and internal water temperature under these conditions during the anodizing period. The temperature rose from its initial value of 17° to 18.6°C. due to the heating effect of the current flow and of the bath electrolyte maintained at 21°C., but thereafter remained constant. The current density also was constant except towards the end when it declined slightly from 11 to 10.5 amp./ft.^{2} Variations in air agitation even when extreme, as from none to vigorous (24-28, and 40-44 minute periods) were without appreciable effect on the current density. This is due to the water cooling which maintained a practically constant metal temperature and thus eliminated the effect of air agitation on metal temperature and current density.

Discussion

Current views on the structure of sulphuric acid anodic films are that the film is highly porous due to innumerable fine pores leading from the oxide film surface through the coating to the metal-oxide interface. However, there is at the base of each pore a thin "barrier" layer of a non-porous oxide film. The porosity of the oxide layer is due to the solvent action of the electrolyte which dissolves the initially formed anodic film at specific points and thus begins the proc-

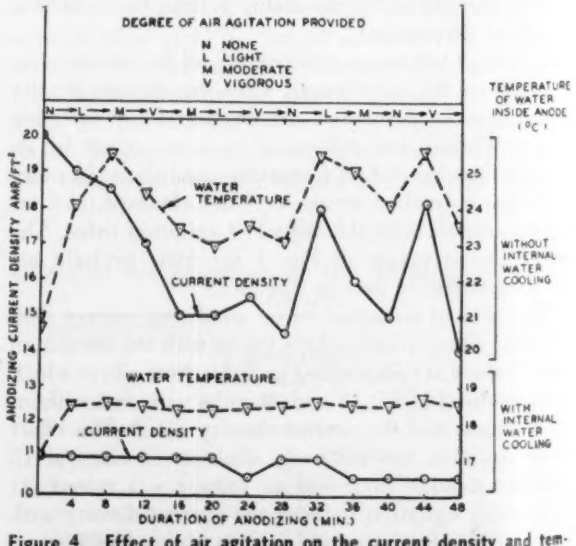


Figure 4. Effect of air agitation on the current density and temperature of water inside anode with and without internal water cooling during anodizing.
(15 per cent sulphuric acid, 21°C., 18 volts.)

ess of individual pore formation. The continued growth of sulphuric acid anodic films depends upon the porosity which varies in extent with the anodizing conditions, particularly the electrolyte temperature, but also with concentration, current density, dissolved aluminum content in the acid and other minor factors. The large number and minute diameter of these pores is indicated clearly by the results of *Burwell, Smudski* and *May*[1] secured by low temperature adsorption studies on sulphuric acid anodic films. They calculated that there were 1.55×10^{11} pores per square centimeter with an average diameter of 107 A°. The average film thickness was 0.0125 mm. or 1.25×10^5 A°, thus the individual pores have a large length to diameter ratio.

Because of this peculiar coating structure most of the anodizing anode-cathode voltage drop of 12-18 volts occurs across the anode-electrolyte interface. Rough measurements with a thin platinum probe electrode and a high resistance voltmeter indicated that under the anodizing conditions employed in the experiments described above, 75 per cent or more of the voltage drop is across this interface. Much of the electrical resistance causing this voltage drop is due to the barrier layer at the bottom of the pore. Thus there is in this part of the circuit a considerable heating effect. Fig. 4 shows a rise in the temperature of the water inside the hollow cylinder from 20.5° to 24°C. during the first four minutes of anodizing without internal water cooling and without air agitation. This temperature rise was due to this heating effect. During the anodizing of sheet samples a large portion of the heat evolved at the anode is adsorbed by the electrolyte but it would appear that the actual temperature of the electrolyte at the base of and in the pores will be considerably higher, by perhaps 10° or more, than the measured temperature of the bulk electrolyte. This rise in temperature greatly increases the dissolving power of the electrolyte in the pores and plays an important, perhaps central part in the formation and continued growth of the individual pores.

The above considerations suggest why air agitation influences the current density and the film thickness as shown in the experiments described above. In the first case with a fixed bath voltage increasing agitation decreases the current density. This appears due to the more effective cooling thus provided which lowers the speed of oxide dissolution by the pore electrolyte and so slightly increases the thickness and the electrical resistance of the barrier layer. The current density thus falls. In the second case, increasing air agitation, under constant current density conditions, increases the anodic film thickness. This is due to the lowering of the temperature and of the dissolving power of the bath electrolyte which causes a decrease in the rate of dissolution of the oxide film between and around the mouths of the pores. The same effect, but to a larger degree, is produced by anodizing at a lower electrolyte temp.

The experimental work described above was restricted to sulphuric acid anodizing. However, it is believed that air agitation would have effects similar to those discussed with other anodizing electrolytes such as chromic or oxalic acid solutions which produce porous anodic films. Anodizing under such conditions will affect the structure of the anodic film produced and this will modify to some extent the air agitation effect.

Air agitation is an important factor in anodizing, since it alters to a considerable degree the temperature at the areas where the anodic film is being formed and so influences the characteristics of the anodic coating.

Reference

1. Burwell, Smudski and May, J.A.C.S., 1947, **69**, 1525.

MANUFACTURING NAME PLATES

(*Concluded from page* 64)

guidance of Tony Lopresti, is confined to name plate, identification plate and savings bank work. It is not designed for, nor is job plating work solicited. The plating solutions employed are nickel, chromium, silver, copper and black nickel, all of which are standard, as used throughout the electroplating industry.

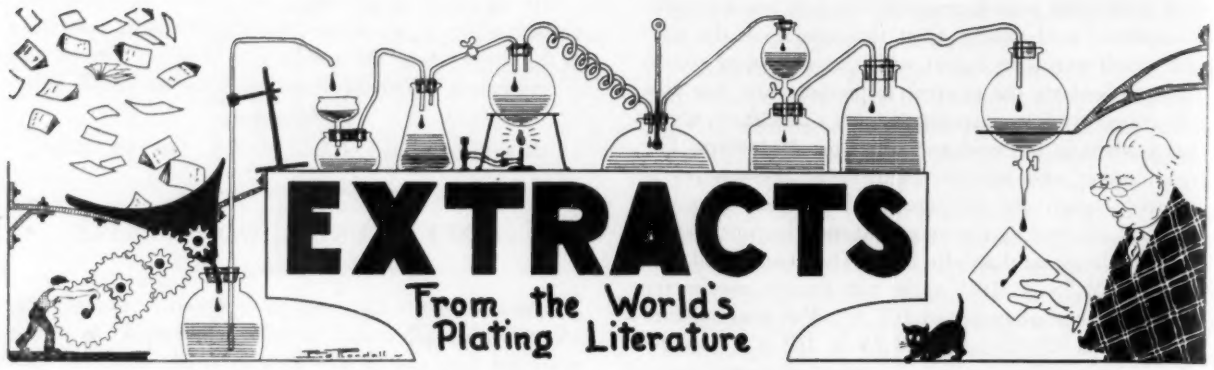
Chromium plating is carried out with the standard chromic acid-sulphate bath. The nickel solution is the room temperature single nickel salt, gray nickel type. The silver plating cycle employs the usual cyanide bath, while the copper plating baths, two in number, are the common acid sulphate and cyanide solutions. The chromium plating solution, thermostatically controlled for temperature regulation, is contained in a steel tank, whereas the nickel solution is carried in at pitch lined wooden tank the same as the black

Figure 13. View of control laboratory.

nickel solution. The silver and the two copper plating solutions are held in ceramic tanks.

In the bank division, a variety of small plastic and metal coin saving banks are assembled. Finished with the colored anodized coating, chromium plated, enameled or colored plastic combinations, these attractive items are supplied to financial institutions and distributed by the institutions as advertising media. Descriptive name plates are attached to each bank. These banks are manufactured in various designs — the metal money barrel, the compact pocket dime bank, the attractive plastic house bank, and the infant of the bank line, the transparent plastic lantern bank.

Behind all of these operations is the laboratory, headed by *Rudy Jaeger*. Here, plant operations are controlled, materials tested, solutions analyzed, and new methods of manufacture and new products studied. A first aid department also is available at all times where there are two nurses in attendance.



Defects in Barrel and Drum Plating

O. Niedermeyer; *Metalloberflaeche*, vol. 6, No. 1, pp. B10-B11.

Considerable complaints are often voiced regarding the unsatisfactory corrosion resistance and bad appearance of small parts processed in barrel plating plants and the author discusses the reasons for this and means to adopt to avoid such a condition. The first requirement for trouble-free operation is, as in all branches of plating, thorough degreasing, descaling and removal of all pickling slimes. In most plating shops the following procedure is customary. The parts are degreased in baskets either in trichlorethylene or else in a hot alkaline degreasing solution. The first cause of trouble arises at this stage. As with mass produced small parts, it is usually a question of handling small stamped objects, these will have a tendency to stick together in the degreasing solution in spite of shaking. The result is that these parts take the subsequent plating in the barrel only poorly and slowly. Or else the deposit forms and the scarcely visible residues under the plate break through after a short time. If this happens in storage, time and money must be expended in reprocessing. Worse still, if the goods have been shipped, bad business results and goodwill is lost.

Recommended practice to avoid these troubles is as follows. The parts are degreased in a drum. The container and drum are of steel construction. The container must be heatable and the liquor arranged to be drawn off when required. Hot alkaline degreasing is recommended. The advantage is that parts are agitated freely and thoroughly degreased. By the vigorous agitation, in addition, obstinately adhering dirt and difficulty soluble drawing lubricants are mechanically removed. Either a built on rinsing drum can be used or the rinsing conducted in an associated rinse drum. Simple rinsing in baskets or sieves, as is so often practiced in small plating shops, is not sufficient.

The same thing can happen at the pickling stage. If the parts are pickled in baskets, they will be in contact with one another and parts of the surface will not be pickled effectively. Here again, drum pickling is to be preferred, the containers of acid resisting material and the drums of plastic or similar material. Drum rinsing ensures that all residual acid in the recesses, holes, etc., is removed and acid carry-over into the plating bath is avoided.

At the plating stage, the selection of a barrel or drum plating unit will depend upon the type of part being processed. The advantages of barrel plating units are that the parts can be continually supervised during the running time. In the case of parts with external threads, by correct charging of the barrel and a suitable inclination angle of the barrel, damage to the screw threads can be avoided. The disadvantages of barrel plating is that the current take-up is bad and the ratio of ware: anode is bad. As the anode surface is steadily reduced during the working, the ratio becomes continuously more unfavorable, which necessitates longer running times. The advantages of a drum plating unit are that with correct choice of electrolyte the current take-up is at least four times as great and the anode surface is at least 12 times as great for an equivalent unit. In an inclinable plating drum with built-on rinse container a more fundamental rinse is possible. This improves the appearance of the finished parts quite appreciably. The disadvantages of the drum type of unit are that coarse large screws or bolts or heavy parts generally cannot be handled without possible damage to the screw threads and edges. With barrel or drum plating, with prolonged plating times, a certain amount of rubbing wear will occur on the plated coating. Thus with a 2½ hours plating time, a reduction in thickness of up to 30 per cent has been established. This signifies that the plated coating will actually only be two-thirds of that theoretically calculated from the current density, surface area of the parts and the plating time. Accordingly, unless rapid plating is being practiced, this is a factor that must be taken into consideration, particularly if the plating is required to give corrosion protection: otherwise the plate applied may not be sufficiently thick to fulfil its protective function.

Temperature in Electroplating Practice

J. Liger; *Galvano* (Paris), vol. 21, No. 184, pp. 15-17.

In the case of plating baths being operated at normal temperature, unsuspected appreciable temperature fluctuations can occur during the bath operation. Thus if one regards the term ordinary temperature as around 15°C., examination will show that in winter the bath

temperature will often fall to 5°C., while in summer the temperature can often reach 25°C. This is a fairly wide temperature range and will have an appreciable influence both on the operating conditions of the bath and on the structure of the deposit. Thus, although the bath may operate well during the summer period, troubles will appear during the winter months without any apparent change in the bath condition. The deposits will tend to become brittle and it will be found difficult to operate at the normal current densities as edge burning will occur.

A number of relevant factors are involved in connection with the effect of temperature on the plating bath. When the temperature is raised without changing any of the other conditions of the electrolysis, the crystalline structure will be coarser than that obtained at a lower temperature. Thus, to recover the fine grained structure at the higher temperature it is necessary to raise the applied current density. Conversely, when the bath temperature is lowered, finer crystals are obtained for a given current density.

Temperature modifications often exercise an appreciable influence on the phenomena occurring at the cathode. Thus, in the case of an acid zinc bath, the variation of the hydrogen overvoltage leads to coarser deposits which cover the surface irregularly when the bath is worked at a higher temperature. In the case of nickel baths, the complex cathodic reactions give rise to basic products which are occluded in the deposit and modify the properties of the plated metal. Temperature is one of the factors which modify these reactions. Below 10°C., the nickel deposit tends to break up into small hard patches which adhere badly to the base metal. On the contrary, at 35°C., the deposits are more ductile and softer and they have less tendency to flaking. Hydrogen occlusion was blamed for this adhesion trouble with nickel deposits and this opinion was held for a long time. Recent work has shown that the trouble is due to colloidal basic products which are liberated during the electrolysis.

The influence of temperature on the throwing power of a plating bath is a fairly complex phenomenon. It is the resultant of two opposing influences. The temperature rise serves to increase the bath conductivity. In addition, by facilitating the diffusion of the ions, it diminishes the cathodic polarization. According as to whether the first or the second of these phenomena is the dominant influence, the throwing power is increased or diminished. Often these two variations will serve to cancel each other out and a temperature rise will only modify the throwing power then to a slight extent. Thus, in nickel baths, the variation of the throwing power with temperature will depend on the pH value of the bath. The variation is not noticeable when the pH is high but is quite definite with a low pH bath. In the case of chromium baths, the throwing power will be better around 35°C. than towards 55°C.

Temperature changes in the plating bath will most often necessitate modification of the bath factors to obtain a balanced working result. Thus, temperature rise will allow higher salt concentrations to be used, which in turn allows higher current densities. Other factors must be modified in addition. Thus with a nickel bath, for higher temperature operation, the pH value of the bath is modified and the concentration of the alkaline salts. In a chromium bath, the content of trivalent chromium is changed; with an alkaline zinc bath the values of the concentrations in soda and free cyanide. In the case of bright plating baths, the temperature influence is of profound significance on extending the current density range within which bright deposits are obtained. At lower temperature operation, the bright plating current density range will be narrower and this renders difficult the bright plating of deeply recessed and contoured parts, where variations of current density will occur on the surface of the object according as to whether the deposit is forming on a prominence or in the hollow of the recess. It can happen accordingly that an irregular patchy finish will occur, some parts of the surface being brighter than others; at places even a matte effect may result. It is well known, for example, in chromium plating, that the bright range is much more restricted at 10°C. than at 35°C. This is the reason why all round trouble-free operation cannot be obtained from a cold chromium bath, at least for decorative plate.

Influence of Supersonic Wave Field on Bright Nickel Plating

A. Roll. *Zeitschrift fuer Metallkunde*, vol. 42, p. 238.

The author deals with the nature of electroplated nickel deposits, the surface changes of the deposit caused by the application of supersonic waves, the path of the metal ions in the supersonic field, ion discharge at the cathode and the influence of the ion impact angle at the cathode on the surface characteristics. The supersonic field is directed parallel to the cathode. The region of bright nickel deposition was enlarged with increasing supersonic intensity to higher current densities. In the supersonic field, the metal ions acquire an additional fluctuating movement component in the propagation direction of the supersonics which is imposed on the migration velocity.

As a result, the metal ions do not strike at right angles to the cathode, but at a defined angle which is of uniform dimensions in the bright plating range. If this angle is smaller, then granular deposits are formed and if greater, rougher deposits, but which are still bright and which are only observed under the effect of the supersonic field. It was concluded from the research that physical dimensions which are expressed by the impact angle of the ions on the cathode are decisively distributed in the formation of bright deposits.

Structure of Mechanical and Electropolished Surfaces

R. Raether, *Mikroskopie* ,vol. 5, p. 101.

The author shows how the method of electronic interference can be used with results similar to the electron microscopic process for the investigation of surface condition, particularly for clarifying the structure of a cold processed surface. The work hypothesis developed by Beilby was not confirmed during the course of this research but more precise information was obtained on the question of surface structure which is of general significance both for microscopic as well as problems of a physico-chemical nature.

Research on Electropolishing of Aluminum

J. Plateau, G. Wyon, A. Pillon and C. Crussard; *Metaux*, vol. 26, p. 235.

Research is described which was conducted on aluminum of 99.99 per cent purity and the Jacquet acetic-perchloric acid electrolyte. The bath must work itself in and after some time this can be accelerated by the addition of aluminum chloride or perchlorate. A bath of maximum viscosity works best, with maximum resistance. It was possible to isolate the anode skin formed and there was found a very viscous liquid and a white product which attacked the aluminum above 100°C., with the generation of gas; this is caused by the gas generation when one polishes with too strong a current. The initial phase can be by-passed if the pieces are first dipped in this product.

Local potential measurements showed that with the potential fluctuations in the anode skin a viscous associated coating is formed which is doubtless formed by the previous mentioned viscous liquid and is identical with the diffusion layer mentioned by other workers. In a non-agitated bath, the anode layer flows downwards while the viscous coating flows upwards. The anode skin forms an electrical resistance and, where it is interrupted, the viscous coating is strongly forced from the piece, as a result of which the attack becomes stronger. The author gives an explanation of the periodic fluctuations and of the difference between macro- and micro-polishing.

Electropolishing of Pure Aluminum by Repeated Eloxal Anodizing and Dissolving of the Eloxal Coating

R. Lattey. *Metalloberflaeche*, vol. 6, No. 3, pp. A41-A48.

With the chemical and anodic polishing of aluminum, the fundamental principle is to dissolve off the oxide skin present and to smooth the surface. According to Huber, fundamentally with all electropolishing processes and also with chemical polishing processes, the smoothing effect results from the fact that the reaction products dwell longer in the surface valleys than on the peaks. The author discovered during research on the Eloxal process in oxalic acid, that a repeated Eloxal anodizing treatment, stripping and subsequent anodizing, also led to a surface smoothing. This confirms the theory postulated by Huber and also gives proof of the fact that even very thick oxide cover coats on aluminum do not prevent the smoothing of the metal surface. It is shown that the smoothing effect is most pronounced when anodizing in an oxalic acid electrolyte. This is ascribed to the fact that, on account of the hydrolysis of the aluminum oxalate formed, the depressions in the Eloxal coating, because of sliming with aluminum hydroxide, are subjected to less of the dissolving-back effect of the electrolyte than the peaks are.

The research showed that Eloxal anodizing treatment of pure aluminum with combined alternating/direct current in oxalic acid led to a smoothing of the metal surface. Repeated solution and subsequent anodizing served to increase the polish. The maximum reflective power is generally reached after the third WGX Eloxal anodizing treatment. Further anodizing and solution treatment allows the metal structure to become visible by a graining effect. With sulfuric acid anodizing it was not possible to achieve such a high reflective surface as with the oxalic acid treatment.

The practical use of the dissolving process with the polishing of reflectors shows more clearly the increase of the reflective value with from 1-3 dissolving stages. Reflectors of Reflectal metal, with 0.5 per cent Mg., gave more favorable mirror values than those with 2 per cent Mg. or of Raffinal metal. With flat test sheets this ratio relation was changed in favor of the Raffinal metal.

The application of the three stage WGX polishing process to test sheets of lower quality gave a clear rise in the reflective values with increasing degree of purity of the metal, both as regards the total reflection as well as directed reflection.

Buffing and Coloring

W. Burkhart; *Metall*, vol. 5, p. 250.

The author deals with the fundamentals of buffing and coloring and the resulting requirements in connection with buffing and coloring materials. The buffing process consists of a forming-equalizing procedure while on the other hand, the coloring process avoids all forming-equalization. During the buffing, the prominent parts of the surface are pressed into the recesses below the rupturing limits of the metal or alloy by plastic deformation and the surface is thus equalized and smoothed. By the buffing process only a certain smoothness is achieved and it is only the coloring stage which achieves a true brilliancy. The ideal surface condition is accordingly that when the prominent surface irregularities suffice to fill the recessed depths.

An optimum finish is thus not in itself a criterion of the quality of a high grade coloring material but is just as much a result of the previous buffing stage. This knowledge is of considerable significance in the application of plated coatings. As every metal and every alloy has a different rupturing strength limit it is the task of the buffing material producers to ascertain the most suitable particle size or the most suitable average combinations respectively for the individual metals and alloys since 2 to 3 buffing processes frequently precede the coloring stage. The particle size is of significance as regards the buffing compositions and the hardness with respect to the coloring compositions. The choice of the bonding agent for the buffing particles is of outstanding importance.

Hard Iron Plating

E. Raub and B. Wullhorst; *Mitt. d. f. Mittgl. d. Forsch. Blechverarbeitung*, (1951). p. 279.

In many respects, hard iron deposits show a similar behavior as do hard chromium deposits; the hardness attains that of hard chromium plate and also the hardness changes during heating are similar; the chemical properties are those of iron. In practical operation hard iron baths are difficult to work and further research is necessary to improve the separation conditions.

Shop Problems

METAL FINISHING publishes, each month, a portion of the inquiries answered as a service to subscribers. If any reader disagrees with the answers or knows of better or more information on the problem discussed, the information will be gratefully received and the sender's name will be kept confidential, if desired.

Copper-Cleaner Combination

Question: I recently read an article in METAL FINISHING, February 1952 issue, which gave a formula for a copper cleaning solution containing:

Caustic soda	6 oz./gal.
Trisodium phosphate	4 "
Sodium cyanide	1 "
Sodium carbonate	2 "
Copper cyanide	½ "

I made up this solution and operated it at seven volts, temperature 180°, and I got a good deposit but it was very dull. Can you tell me how to get a good bright copper deposit with this solution? I also want to know how to control and check by analysis. I want to use this as a base for barrel nickel. I am running my nickel at 12 volts, temperature 120°. I am plating a cheap luggage hardware and do not want to use the conventional copper.

R. LeC.

Answer: You can obtain a brighter deposit by increasing the free cyanide to 1 oz./gal. and lowering the voltage. You can also try small additions (4 oz./100 gal.) of sodium thiosulfate and sodium sulfite as purifiers.

Since there is no advantage in using a copper flash base under nickel on luggage hardware we would suggest that you use a regular alkaline cleaner rather than a copper cleaner. The copper and cyanide contents can be determined by the usual simple analytical procedures but analysis of mixed alkalies such as carbonate, phosphate and caustic soda are much more involved. The American Society for Testing Materials, 260 Broad Street, Philadelphia 2, Pa. has issued specifications of methods for chemical analysis of industrial metal cleaning compositions. We would suggest you write them for prices of reprints.

Metallizing Plastics

Question: Enclosed you will find two samples. I would like some information as to what is the best method of coating this plastic with a silver or gold finish. I read the article on plating on plastics in the '51 Guidebook and it would seem that the mirror spray method would be the most economical. The thickness of the coating does not matter.

I would like to know who sells the equipment and solutions necessary and the approximate cost of them.

G. L. L.

Answer: The plastic samples have been copper plated, ball burnished and then gold plated. The silver mirror spray method of metalizing would be suitable but, in the case of such small objects, it would be more economical to apply the silver mirror to the surfaces in bulk, which is the general procedure followed in metallizing buttons and ornaments.

The book, Metallizing Non-Conductors, by Wein, contains the formulas for the sensitizing, silver and reducer solutions, and will give you all the information you require to produce this finish.

Equipment and solutions for silver spray methods can be obtained from the following:

All-Conductive Spray, Inc.
648 Bedford Avenue
Brooklyn 11, N. Y.

Peacock Laboratories, Inc.
54th St. & Paschall Ave.
Philadelphia 43, Pa.

Water Supply

Question: We are planning on installing a plating department in our Kentucky plant. At the present time we are going to do cyanide bright zinc plating, but later on we will probably install equipment for copper, brass, cadmium and nickel plating. All will be barrel plating.

I have written for an analysis of the water and I am enclosing a copy of this report issued by the Kentucky State Department of Health, Division of Sanitary Engineering.

In your opinion, would this water be suitable for plating purposes?

Color	Less than 5
pH	7.7
Turbidity	Less than 2ppm.
Acidity ($CaCO_3$)	3 ppm.
Total Solids	198 ppm.
Dissolved Solids	198 ppm.
Suspended Solids	0 ppm.
Chlorides	15 ppm.
Total Hard. ($CaCO_3$)	165 ppm.
Carbonate Hard.	53 ppm.
Non-Carb. Hard.	112 ppm.
Total Alk. ($CaCO_3$)	53 ppm.
Hydroxide Alk.	0 ppm.
Carbonate Alk.	0 ppm.
Bicarb. Alk.	53 ppm.
Calcium (Ca)	48 ppm.
Magnesium (Mg.)	11 ppm.
Sulfates (SO_4)	79 ppm.
Iron, Total (Fe.)	0.8 ppm.
Maganese (Mn.)	0 ppm.
Fluorides	0.1 ppm.

F. C. D.

Answer: The water analysis you forwarded would indicate a moderately hard water supply. No contaminating metals or salts are present to any appreciable extent so that the only effect you would experience with this water in the plating room would be precipitation of calcium and magnesium carbonate. This can be handled effectively by filtration in the normal manner, if necessary.

If you use deionized water for make-up and for the last rinse before plating, the small amount of precipitation can be avoided.

Electroless Plating

Question: We have recently become interested in electroless plating by chemical reduction, but are finding very little published literature on this process. We wonder, therefore, if you could recommend any sources of in-

formation on this method of plating.

E. M. N.

Answer: Plating by chemical reduction was the subject of an article by A. Brenner and G. E. Riddell (ref: Proc. American Electroplaters' Soc., pp. 23-9. 1946) and U. S. Patent No. 2,532,283 (Dec. 5, 1950), covering nickel and cobalt.

Silver, gold, copper, lead and platinum have been produced by chemical reduction on glass mirrors for many years and formulas may be found in chemical handbooks.

Plating on Stainless Steel

Question: We have been informed there is a process in which stainless steel can be plated brass or copper. If this is so, we feel you can give us the necessary information and tell us what materials we would need.

H. C. V.

Answer: If stainless steel is given a nickel strike in a highly acid solution it can then be plated without any trouble. After cleaning and acid dipping as usual, strike the stainless steel article in the following solution, at 6 volts, room temperature, 20-60 seconds:

Nickel chloride—2 lbs./gal.
Muriatic acid—1 pint/gal.

Use nickel or carbon anodes. When the stainless steel is covered with a thin layer of nickel it is rinsed and then transferred to any plating solution.

Plating Baby Shoes

Question: To date, I have been using a copper powder suspended in lacquer and thinner to make my shoes conductive. However, this method gives me too many spots that don't take and require touch up. Wouldn't a silver nitrate spray remedy this condition?

I would appreciate receiving a formula for this spray with method of preparation and also the best process for sensitizing the surface before spraying. My shoes are rendered impervious with wax, then sprayed with shellac.

L. H. H.

Answer: So far as we know, the copper powder method is standard for plating baby shoes. If you dip the copper sprayed shoe in a weak solution of silver cyanide and sodium cyanide you will get better results and eliminate bare spots. The immersion silver film which forms in this dip will show up non-conducting spots because such areas will not take the silver. The cyanide also has a cleaning action on the copper powder, while the silver film, being a better conductor than copper will result in quicker coverage in the copper plating solution. A solution of 2 oz./gal. silver cyanide and 4 oz./gal. sodium cyanide is suggested.

We do not know if the silver spray method of metallizing will give you good results in this application but the procedure and solutions will be found in the 1951 edition of the Metal Finishing Guidebook.

Carbonate Removal from Silver Bath

Question: We are interested in finding out how to reduce the carbonate content of a silver cyanide plating bath when it becomes too high. We read your Shop Problems with interest.

R. B. C.

Answer: If your silver bath is a sodium cyanide formulation, the excess carbonates can be readily frozen out at this time of the year by exposing the solution in drums outdoors over a week-end. Crystals of sodium carbonate, decahydrate, will precipitate out and the solution can be poured back into the plating tank. A temperature of about 35°F. is required.

If the silver is formulated with potassium salts, the carbonates cannot be frozen out but may be precipitated by addition of powdered, purified gypsum. It will require about 1¼ oz. of gypsum to precipitate 1 oz. of potassium carbonate.

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Recently Granted Patents
in the Metal Finishing Field

Patents

Buffing Wheel

U. S. Patent 2,616,227. *Nov. 4, 1952.*
H. J. McAleer.

A buffing wheel comprising a plurality of cloth layers folded into an annular buffing ring with the fold defining the inner edge of said ring, a rigid centering disc supporting the inner edge of said buffing ring, said centering disc having a central aperture for receiving a spindle and having its outer edge radially slitted to form a plurality of lugs around the periphery of said disc, the successive lugs being alternately offset, one lug on one side and the next lug on the other side of the plane of said disc to define a groove for the folded inner edge of said buffing ring, the successive lugs at each side of said wheel being spaced apart, and a ring member enclosed within the fold of said fabric layers and clamping the inner edge of said buffing ring in said groove, said inner folded edge of said buffing ring having a thickness greater than the width of said groove whereby the portion of said cloth between successive lugs on each side of said wheel bulges outwardly beyond the plane of said lugs and prevents said centering disc from rotating relative to said buffing ring, and including means formed on the outer face of said lugs for keying said disc with the lugs of a similar disc when a plurality of said discs are arranged adjacently on a spindle.

Buffing Wheel

U. S. Patent 2,616,228. *Nov. 4, 1952.*
C. F. Schlegel, assignor to The Schlegel Mfg. Co.

A buffing unit for buffing wheels of the centrifugal air cooled type embodying an annual body of fabric material, and a generally annular binder of sheet material embracing the central edges of the fabric, the said binder being U-shaped in cross section forming a connecting portion for contact with the drum of the wheel and lateral flanges engaging the fabric on their inner sides, the outer sides of the flanges being provided with circumferentially spaced protuberances to air space the unit from a like adjacent unit and interlock rotationally with the protuberances on the latter, said protuberances being externally convex and being spaced from each other circumferentially of the wheel by a clear distance substantially greater than the dimension of each protuberance in a direction circumferentially of the wheel, so that the protuberance of one buffing unit may enter the space between two adjacent protuberances of the next adjacent buffing unit and still leave space for radial passage of air between the two units.

Activation of Oxalate Metal Coating Compositions

U. S. Patent 2,617,749. *Nov. 11, 1952.*
R. C. Gibson, assignor to Parker Rust Proof Co.

A composition of matter for coating a stainless steel to protect the metal during a deformation operation such as drawing and the like consisting essentially of an acidic aqueous solution of oxalic acid, the ferric ion and the thiocyanate ion, said ferric ion being present in an amount of about .4 to 15% and said thiocyanate ion being present in an amount of 1½% to 40%.

Corrosion Retarder

U. S. Patent 2,617,771. *Nov. 11, 1952.*
J. T. Rucker, assignor to Hooker Electrochemical Co.

The method of protecting metals against corrosion by dilute aqueous acids which comprises incorporating in the acid 0.005 to 5.0 per cent by weight of a quaternary ammonium compound selected from the group consisting of lauryl pyridinium thiocyanate and lauryl dimethyl benzyl ammonium thiocyanate.

Apparatus for Treating Metal Parts With Liquid

U. S. Patent 2,618,283. *Nov. 18, 1952.*
N. Ransohoff, assignor to N. Ransohoff, Inc.

A machine for treating metal parts, comprising a plurality of treatment solution tanks arranged in end to end relationship, conveyor chains respectively movable horizontally along the series of treatment tanks at opposite sides thereof, stationary support rails slidably engaged by said chains for slidably supporting said chains against deflection under weight loads, means for continuously moving said chains in unison along the series of tanks, racks adapted to support metal parts for immersion thereof in solutions in said tanks, said racks having lateral extensions adapted to rest directly upon said chains and be advanced thereby through frictional engagement therewith, the said chains having flat upper and lower slide surfaces, the lower slide surface being engaged upon the support rails and the upper surface being slidably engageable by the said lateral extensions, positive abutment stops arranged transversely in alignment in respect to said tanks adjacent said chains in the paths of movement of the lateral extensions of said racks, whereby said lateral extensions of said racks come into engagement with said positive stops and are restrained against further movement while the chains are free to move slidably beneath the said lateral extensions, and vertical lift assemblies comprising endless chains having vertically ascending and descending runs extending above and below the horizontal chains and respectively straddling adjacent tanks, the said endless chains of the lift assemblies having lift members engageable with lateral extensions of those racks which are restrained by said positive stops for serially lifting the racks from one tank and lowering them into the next tank until the lateral extensions thereof are re-engaged frictionally upon the horizontal conveyor runs.

Method for the Regeneration of Spent Iron and Sulfuric Acid Pickle Liquors

U. S. Patent 2,616,790. *Nov. 4, 1952.*
N. Swindin.

A process for the regeneration of spent acid liquors containing ferrous sulphate and sulphuric acid, compris-

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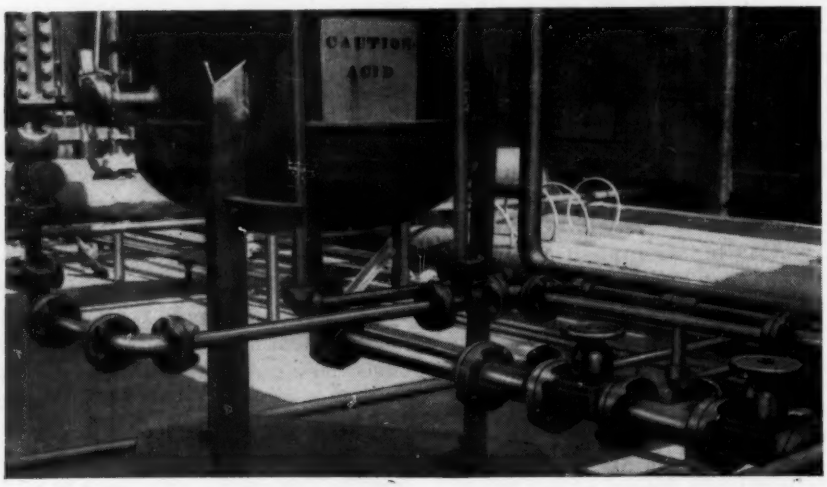

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ing confining a body of a solution of sulphuric acid having an initial concentration of 40% to 60%, constantly heating and evaporating water from said body of solution by a submerged flame and concurrently withdrawing spent acid liquor from a treating bath and adding the same to said body of sulphuric acid solution, said evaporation and addition of spent acid liquor being at such relative rates as to maintain the concentration of sulphuric acid in said body constant at a specific percentage between 40% to 60% for precipitation therefrom of granular and readily filterable ferrous sulphate in the form of $FeSO_4 \cdot XH_2O$ in which X is less than 3, removing the precipitated ferrous sulphate and liquid from said body of acid solution, separating the ferrous sulphate from said liquid, and returning the sulphuric acid thus separated to the treating bath.

Packaging Buffing Compound and Like Materials

U. S. Patent 2,617,521. *Nov. 11, 1952. E. T. Candee, assignor to The Lea Mfg. Co.*

A package of greaseless adhesive-containing buffing compound comprising a paperboard cylinder forming the side walls of a container, a layer of substantially non-porous moisture-impermeable material lining the interior cylindrical wall surface of said cylinder, said layer being free from the tendency to adhere to the buffing compound, a substantially rigid metal end closure secured to said cylinder at one end thereof and reinforcing it against collapse, a false bottom in the form of an inverted paper cup of porous paperboard mounted in and secured to said cylinder wall with the bottom of the cup forming the false bottom positioned in spaced relation with said end closure, said false bottom forming with said cylinder wall an annular groove, and a greaseless adhesive-containing buffing compound substantially filling the container above the false bottom and in direct contact therewith, said material being cast in situ within the cylinder directly against the false bottom and in said groove, whereby said buffing compound is fixedly secured to the bottom.

Method for Impact Plating

U. S. Patent 2,618,572. *Nov. 18, 1952. N. C. Parrish, assignor to Northrop Aircraft, Inc.*

The method of plating a surface of

a material harder than titanium with a thin adherent coating of titanium, without appreciable deformation of said surface, which comprises the step of: projecting a spray of titanium pellets against said surface with the axis of said spray at an angle to said surface substantially different from 90°, and thereby applying a component of said spray in a direction parallel to said surface whereby there is secured a maximum plating effect, and a minimum deformation of the surface by impact of the pellets.

Electrolytic Process for Recovering by-Products from Industrial Waste Liquors

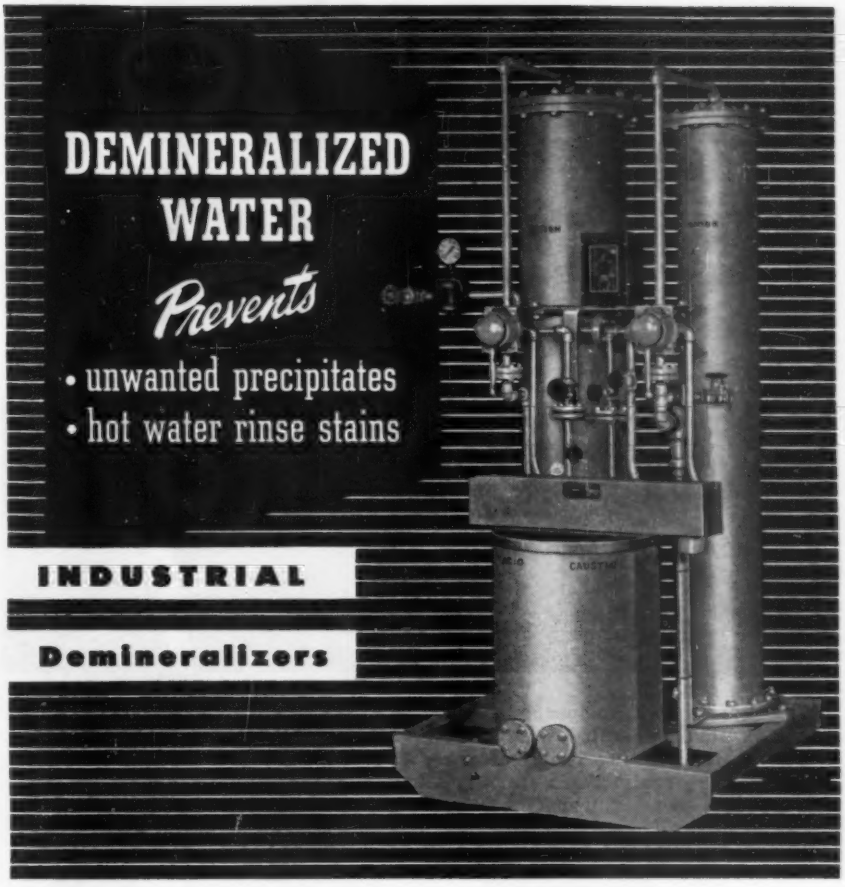
U. S. Patent 2,618,592. *Nov. 18, 1952. G. J. Horovitz.*

The process of treating liquor containing sulphuric acid and ferrous sulphate consisting in dividing the liquor into two separate streams, passing one stream through one series of chambers and the other stream through another series of chambers, maintaining the separation of each series from the other by diaphragms, impressing a positive electric potential on the chambers of the one series, and a negative potential on the chambers of the other series, scrubbing each of said streams separately in the presence of sulphur dioxide, subjecting each stream to further electrolytic action, treating the one stream from the one series of chambers having the positive potential during the further electrolytic action with nascent hydrogen, treating the other stream with nascent oxygen during said further electrolytic action, to form a precipitate of hydrolyzed iron sulphate and sulphur in each stream, removing said precipitate from each stream separately, converting the ferrous sulphate remaining in the other stream into an insoluble salt to separate said insoluble salt from the sulphuric acid in said other stream, and boiling the remainder of the first stream to concentrate the acid therein.

Exhaust System for Grinding Wheels and the Like

U. S. Patent 2,618,916. *Nov. 25, 1952. L. Oftedal.*

In an exhaust system for a grinding wheel or the like, a hood enclosing the major portion of the wheel and having an opening in the upper forward portion thereof, a main exhaust duct communicating with the hood, outwardly



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directed enlargements in either side of said hood adjacent the middle of the wheel, radially extending grooves in the opposite wall portions at the upper front edge of said hood, said grooves communicating at the inner ends with the adjacent enlargement and at the outer ends with the open air, a gate closing the opening in the hood intermediate of the grooves and arranged adjustably in the longitudinal direction of said grooves, and a channel in said gate connecting the grooves at both sides of the wheel.

Cleaning Apparatus

U. S. Patent 2,619,435. *Nov. 25, 1952.*
J. K. Flinchbaugh.

In a cleaning apparatus, a cabinet, a horizontal turntable rotatably mounted within said cabinet, means for rotating said turntable, a ring rotatably mounted in one wall of said cabinet, a vision window sealingly secured in said ring for movement therewith, flexible hose means for conducting cleaning fluid, and means for pumping cleaning fluid under pressure through said hose means, said ring having an aperture therein adapted to receive the free end of said hose means whereby said ring and said window may be rotated either clockwise or counterclockwise relative to said turntable by the application of manual pressure on said hose end to carry said hose end therewith.

Metal Recovery Apparatus

U. S. Patent 2,619,456. *Nov. 25, 1952.*
N. B. Aukerman.

Apparatus of the self-contained, immersed electro-couple type for recovering noble metals from solution comprising a zinc plate partially covered with an iron covering, a paper sheath enveloping said iron-covered plate, a strip winding of an electropositive metal partially covering, externally, said paper sheath, and an electrical connection between said iron covering and said electropositive metal winding.

Method of Gas Plating

U. S. Patent 2,619,433. *Nov. 25, 1952.*
O. F. Davis and H. G. Belitz, assignors to The Commonwealth Engineering Co. of Ohio.

The method of coating base material with a metallic coating which comprises: atomizing a liquefied heat decomposable gaseous metal compound as fine droplets and propelling the same in the form of a spray toward the surface of the said base material to be coated, continuously maintaining base material and its immediate vicinity at a temperature for vaporizing of said droplets, and bringing about rapid decomposition of said metal compound and rapid deposition of metal contained in said vaporous compound on said base material.

Electroplating Anode

U. S. Patent 2,619,457. *Nov. 25, 1952.*
F. W. Wagner, assignor to Wagner Brothers, Inc.

In an anode for an electrolytic bath, an electricity conducting shaft adapted to be suspended in the bath while connected with a source of electrical energy, a plurality of anode members and a plurality of washer assemblies replaceably strung on the shaft alternately and spacing each other, each member having a bore with the shaft passing therethrough in electrical contact with the member, each washer assembly comprising a rigid electricity conducting inner bushing in electrical contact with the members spaced thereby and the shaft and also comprising an outer gasket inert to the bath, each gasket having concave faces at opposite sides to provide for maximum compression axially of the gasket adjacent the outer edges of the gasket to effect a fluid-tight seal around the shaft, each gasket interposed between a pair of said members being compressd therebetween with the degree of compression decreasing radially inwardly from a maximum at its outer edge, the uncompressed thickness of the gasket increasing radially from a thickness less than the axial thickness of the asso-

ciated bushing adjacent the latter to an axial thickness greater than said bushing, and clamping means on the shaft compressing said alternating gaskets and members together to effect said seals and contact between said members and bushings.

Arrangement for Treating Metal Parts

U. S. Patent 2,619,781. *Dec. 2, 1952. E. Buhrer, assignor to Georg Fischer Aktiengesellschaft.*

A device for treating metal parts, said device comprising in combination with a tank for a treating liquid and a drum for said metal parts, ropes suspending said drum within said tank, a lever pivoted intermediate its ends and having two arms of unequal length, said ropes being attached to said ends, and means connected with said lever for swinging the same about its pivot.

Air Cleaner

U. S. Patent 2,620,066. *Dec. 2, 1952. H. L. Gilmore, assignor to Aget Mfg. Co.*

In a dust collecting and air purifying unit, a frame, a filter chamber having a floor and side and top walls, said floor being in said frame and having an opening, a filter in an open portion of at least one of said walls, a cyclone under said floor with the bottom of said floor secured to the top of the cyclone, said cyclone having an upper cylindrical portion and a lower conical portion, a cylindrical sleeve axially mounted inside said cylindrical portion and connected to said floor opening as the outlet of said cyclone into said chamber, radial fins inside said sleeve and extending downwardly therefrom toward the sides of said conical portion, and a blower located below said floor and discharging into said cyclone.

Bright Dip for Aluminum

U. S. Patent 2,620,265. *Dec. 2, 1952. F. H. Hesch, assignor to Kaiser Aluminum & Chemical Corp.*

A composition for the chemical brightening of aluminum and aluminum alloys comprising an acid aqueous solution containing trivalent chromium ions in amount from about .005 to about 0.5%, and hydrogen and fluoride ions in amount stoichiometrically equivalent to from about 0.5 to about 5% nitric acid, and about .01 to about 0.5% hydrofluoric acid by weight of solution.

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when you install a Blakeslee Solvent Vapor Degreaser. Metal parts are rendered 100% oil-free and dry in a matter of seconds. You save on rejects in your finishing process —you save time—you save labor and you add LESS SOLVENT daily with a BLAKESLEE DEGREASER.
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TORONTO 13, ONTARIO

Metal Spray Gun

U. S. Patent 2,620,229. *Dec. 2, 1952. F. Schumacher, assignor to The Cooper Alloy Foundry Co.*

A spray gun for a low melting point metal which is solid at room temperature, said gun comprising a stainless steel cup for a supply of the metal, and a nozzle portion at the bottom of the cup, said nozzle portion having a metal discharge opening and an air discharge opening for atomizing the molten metal, a valve for the metal, a valve for the air supply, a signle control lever for operating both valves, a heating unit protectively housed in a stainless steel tube having a closed bottom and disposed downwardly from above in the middle of the cup to heat the immediately surrounding low melting point metal in the cup in order to melt the same, and means connecting a cold air supply to the nozzle at a point below the heater.

Zinc Cyanide Plating Bath

U. S. Patent 2,621,152. *Dec. 9, 1952. R. A. Hoffman, assignor to Allied Research Products, Inc.*

As an added component for a zinc cyanide plating bath, an aqueous solution containing the reaction product obtained by heating together in aqueous solution from 10 to 30 grams of ammonium thiocyanate, from 10 to 30 grams of dicyandiamide, from 4 to 15 grams of sodium hydroxide, and from 40 to 100 grams of formaldehyde.

Recent Developments

New Methods, Materials and Equipment for the Metal Finishing Industries

Reinforced Fiberglas Tanks and Ducts

Schori Process Div. Ferro-Co. Corp. Dept. MF, 8-11 43rd Road, Long Island City 1, N. Y.

Tanks and ducts are now being fabricated to specifications, without limitation as to size and shape, of Iolyte, a Fiberglas reinforced polyester laminate. No molds are used and a number of advantages are claimed:

1. Economy of manufacture and faster delivery; 2. It is a chemical-resistant structural plastic, not a coating; there is no problem of chipping, crazing, cracking, scratching, or other damage that so often impairs the effectiveness of coatings on steel tanks; 3. A fiberglas reinforced polyester laminate, it withstands higher temperatures than vinyls, rubber, polyethylene, etc.; 4. Although it has the tensile strength of steel, it is only one-fifth its weight; 5. Since no molds are used, the tanks are not tapered so that the entire area is available. Further, sizes and shapes are not limited; 6. Ducts made of Iolyte are easily installed and are especially recommended by manufacturer for corrosive fumes.

Aluminum Oxide Compositions

Hanson-Van Winkle-Munning Co., Dept. MF, Matawan, N. J.

The above company announces a new series of aluminum oxide compositions for the coloring operation in the finishing of zinc-base and aluminum die castings. Laboratory tests and supporting field data indicate that these aluminum oxide compositions give castings of these metals the desired luster or color faster than was before possible with compositions of the same grade of fineness.

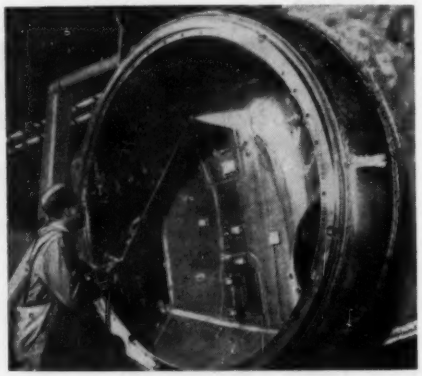
The aluminum oxide compositions may also be used in steel and stainless steel finishing.

Phosphate Type Cleaner

Whitfield Chemical Co., Dept. MF, 14225 Schaefer Highway, Detroit 27, Mich.

A new solvent phosphating cleaner known as Solo-Phos (patent pending) is said to be a three-in-one cleaner. It removes grease and tar, cleans off chips and gives a rust-inhibitive phosphate coating.

Used for one-step cold cleaning and phosphating of ferrous metals, alumi-



num and zinc, it reacts with organic or metallic soils. It has a high solvency for oil, grease, and tar and the rust-inhibitive film formed on metal surfaces makes an ideal base for painting.

It can be applied in concentrated form by spraying, flushing, or dipping. Only standard equipment is necessary. After being allowed to react, it should be spray rinsed. Diluted solutions of the compound can be used hot or cold in tank or hand washing applications.

This cleaner was developed primarily to be used on parts where heat is not available. It will not attack rubber-tired wheels, painted or plated surfaces, and may be applied over plastic coated parts. It is a viscous stable mild acid-solvent that is soluble in water. There is no disagreeable odor when applying Solo-Phos, and its flash point is claimed to be above 200°F.

Environmental Test Units

Tenney Engineering, Inc., Dept. MF, 26 Avenue B, Newark 5, N. J.

This company announces a standard line of high and low-temperature environmental test equipment designed to provide test conditions for the majority of all temperature testing requirements. This standardization permits purchasers to select chambers from existing specifications and eliminates the extra cost of custom built models.

Comprising two separate units, the Servo Unit and the Companion Test Chamber, the equipment furnishes controlled temperatures for conducting physical tests, weathering tests, and aging tests. The units may be purchased independently or collectively. A simple attachment will maintain relative humidity from ambient to 95% in a temperature range from ambient to 180°F.

The Servo Unit is a portable air conditioning unit which can be connected to laboratory enclosures to provide air circulation of 40 cu. ft. per minute.

Low temperatures are achieved by circulating air over dry ice. High temperatures are achieved by circulating air around electric heaters.

The Companion Test Chamber, an insulated chamber in which tests are actually conducted, is available for

one glance proves there's no equal to H-VW-M Bias Sisalweev

See that weave? The sisal is cut *on the bias.* Every fiber is directed *toward* the cutting edge. There's no danger of whole strands flying off at high speed. Every Bias Sisalweev wears *evenly* and outlasts any other design.

You'll find a Bias Sisalweev ideal for heavy cutting down of drawn, stamped, or cast ferrous and non-ferrous articles. You can use it at high or low speeds—it's impossible to scorch at any speed or pressure. And, it's ventilated —24 air channels give extra cooling.

Bias Sisalweev is supplied either treated or untreated, but we recommend the exclusive H-VW-M HC, (heavy cut) treatment. This not only increases the rate of cut, but lengthens wear life and power to hold composition. And for buffing steel, you can't beat the combination of a Bias Sisalweev and H-VW-M 6-B-97 composition for heavy cut or 6-B-66 for medium cut with finer finish.

Bias Sisalweev is just one of many results of over eighty years of constant electro-plating and polishing development — a continuing policy summed up in H-VW-M Platemanship . . . your working guarantee of the best that industry has to offer not only in brushes and buffs—but in every phase of plating and polishing.

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Further information on Bias Sisalweev is available on request.

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Find out how, where and why Simonds Borolon abrasive grain is superior for *your* operations. This free bulletin describes grain sizes and types, lists recommended uses, and tells how to use Borolon grain on set-up wheels. It's the same top quality grain used in making Simonds grinding wheels, mounted wheels, points and segments. Write for bulletin ESA 198 and name of your Simonds distributor.

SIMONDS ABRASIVE CO., PHILADELPHIA 37, PA. BRANCH WAREHOUSES: CHICAGO, DETROIT, BOSTON

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Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N. Y., Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd., Arvida, Que.

use in conjunction with the Servo Unit. Attachment is by means of a simple fastening device which may be disconnected to permit the Servo Unit to be used as a source of conditioned air for other enclosures. The chamber has a stainless steel liner, a door equipped with a multi-pane inspection window, and can be installed so that the door will hinge upward or to one side.

Optional equipment includes electrical connector panel, turning shafts, coaxial cable, utility ports, and high-voltage.

New Heat-Resistant Hard Rubber

American Hard Rubber Co., Dept. MF, 93 Worth St., New York, N. Y.

Ace Tempron, a new synthetic hard rubber compound, now makes even greater chemical resistance, strength, and economy of hard rubber available for sustained high-temperature applications in handling many corrosive solutions.

Based on nitrile synthetic rubber (Buna-N), it is a *hard* rubber, and has greater rigidity, heat resistance and chemical resistance than the hard and soft nitrile rubber compounds hitherto available. At present it is available in four forms: (1) Pipe and fittings; (2) Molded parts, with limitless design possibilities; (3) Sheet, rod and tubes from which a wide variety of shapes can be machined or fabricated; and, (4) a hand-fabricating process for making tanks, large fittings, etc., by forming sheets around cores or mandrels while still in the soft state prior to vulcanization.

In chemical resistance at elevated temperatures, Tempron is stated to generally excel other rubber and plastic materials. At room temperatures, it resists nearly as many inorganic corrosives as natural hard rubber, and in addition, it is resistant to many organic chemicals which attack natural hard rubber, soft rubber, and plastics. It is not recommended for sodium hypochlorite or for strong oxidizing agents such as nitric acid.

Tempron is not just one formula. Rather it is a group of compounds which can be altered in many different ways to give just the right combination of physical, chemical and electrical properties for each specific application. It is a thermosetting material that is compression-molded in the same types of molds, using the same vulcanization techniques as for hard rubber.

Conveyor Chain Lubricant

The Alpha Corporation, Dept. MF, 179 Hamilton Ave., Greenwich, Conn.

Molykote M-30, a new dispersion of near-colloidal particles of Molykote powder suspended in a polyalkylene glycol vehicle, has been announced by the above company.

It is particularly useful in high temperature applications such as oven chain lubrication. The success of this product as an oven chain lubricant is attributed to the fact that the polyalkylene glycol vehicle allows the particles to be carried into the most inner recesses of the chain where the wear is most prevalent. The vehicle dissipates under the heat and a smooth, tenacious film of lubricant is attached to the pins, bushings and rollers.

The product can be applied by brush or oil can. If it is to be used in automatic lubricators, it is recommended that the agitator type of lubricator be employed, since there is a slight settling in this dispersion.

Completely Submerged Plating Barrel

Hanson-Van Winkle-Munning Co., Dept. MF, Matawan, N. J.

This company announces new submerged barrel plating equipment which completely immerses the plating barrel in the electrolyte. All surfaces of the work receive a uniform solution contact because no parts can be exposed to the air while tumbling. This results in a consistent, all-over even finish. The completely submerged barrel also permits greater current density and thus enables faster plating.

The new equipment includes both barrel and plating tank. The barrel is hexagonal in shape and has an inside diameter of 14″. Barrels are available in 30″ and 36″ lengths, having approximate capacities of 125 and 150 pounds respectively.

Plexiglas barrels are recommended for all-round use in solutions up to 180°F. Melamine is recommended for use in solutions up to 210°F. Plexiglas barrels have 1″ thick heads and ½″ panels; Melamine barrels have 1″ thick heads and ¼″ panels with rib reinforcement.

The barrel is suspended in the plating solution on hanger arms which form an integral part of an angle-iron frame which transverses the top of the tank. Frame contact pins fit into tank saddle brackets and provide electrical contact between bus bars (on which

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for on any of these metals Iridite gives you a high performance finish at a low cost from a simple chemical dip.
IF YOU WANT HIGH CORROSION RESISTANCE,
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you'll find Iridite prevents underfilm corrosion and soap formation.
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investigate zinc plate and Iridite (Bright) for a chrome-like decorative finish with more corrosion protection than conventional chrome plating . . . or Iridite (Metcote) as a treatment for copper that eliminates the need for buffing in the copper-chrome system; produces a sparkling bright finish!
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Use Heil Lead Anodes

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in Heil lead anodes. These anodes have been used by leading chrome platers for many years because of their excellent throwing power and extreme rigidity. The heavy center spline which is an important feature of the Sawtooth anodes, prevents curling and gives you longer service life.

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We offer you the widest range of standard hook styles to choose from. Available to you in any lead alloy with thickness up to 1½".

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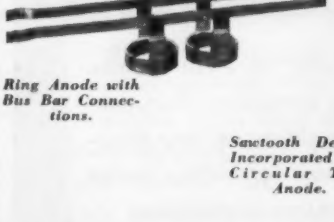
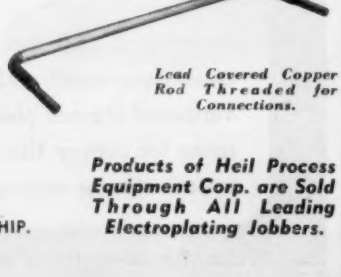


Ring Anode with Bus Bar Connections.

Sawtooth Design Incorporated in Circular Type Anode.



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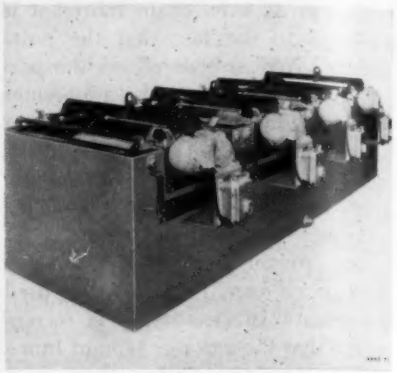
saddles are mounted) and barrel heads (equipped with flexible dangle contacts).

Tanks are constructed of ¼" double electric-welded steel. The drive motor, including speed reducer, is mounted on a shelf at one end of the tank. Tanks are painted with rust-protective gray enamel and trimmed with black. Each tank has a 2" drain at the bottom and has space for mounting two heating or cooling coils. Special vulcanized-



rubber or koroseal-lined tanks are available for use with acid solutions. Cast iron hanger arms and gears can be supplied for cyanide solutions. Rubber-covered cast-iron hanger arms and plastic gears can be ordered for acid immersion.

For further information about submerged barrel plating write to the company and ask for Bulletin PB 108.

Roughness Comparison Specimens

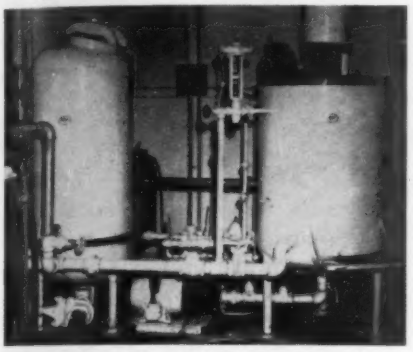
Acme Industrial Co., Dept. MF, 200 N. Laflin St., Chicago 7, Ill.

A new line of roughness comparison specimens, also known as "Surface Sticks" has recently been announced. According to the manufacturer, these specimens were designed to meet the need for a low cost, yet practical, accurate means of determining smoothness or roughness of a surface. They are economically priced so that even small shops can now be equipped with precision standards for determining smoothness or roughness of a surface. Simple, easy to use, they consist of various surface specimens individually finished to definite micro-inch readings and grouped together in handy finish-comparison bars. The operator merely holds the Specimen Bar opposite his work to make a fast, accurate visual comparison check of surface roughness, waviness and lay. Surface finishes can be instantly compared and checked for conformation to specifications, right at the machine.

Acme Roughness Comparison Specimens can be furnished in approximately 1" x 1" round plug form, and in approximately 1" x 1½" x 1" rectangular blocks, in boxes accommodating 3, 5 or 8 assorted surface finishes.

Tank-Type Pressure Filter

Ogden Filter Co., Dept. MF, 4214 Santa Monica Blvd., Los Angeles 29, Calif.



A new tank-type pressure filter being introduced by the company for the filtering of chemicals, electroplating solutions, the recovery of wastes and treatment of waste water, eliminates all cloths, papers, screens and pads. Yet, the unit insures controlled quality filtration and higher flow rates at much lower operating costs both in filter material and labor. A series of synthetic, rigid porous stone membranes upon which the filter-aid coating is deposited provide a perfect retaining surface for the formation of a controlled clarity filtration, and allow a fast and thorough backwash.

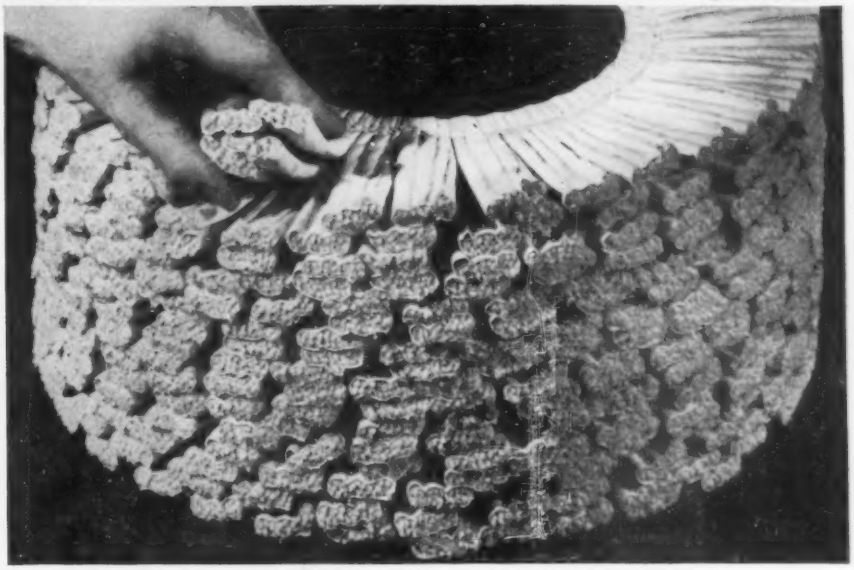
The use of diatomaceous silica, the most flexible and least expensive of filter media, supplies desired clarities at exceptionally high flow rates. The filtration cycle is greatly lengthened due to the fact that a new filtering surface constantly increasing in size is presented to the liquid being filtered. Complete cleaning and even sterilization of the filter can be accomplished without opening the chamber. A patented tank closure permits the unit to be opened for inspection or adjustment by the release of just two bolts. These filters are available in all capacities in all metals and alloys as well as plastic or rubber lined to meet specific problems.

Plastic Glove Reconditioning Service

U. S. Industrial Glove Corp., Dept. MF, 9350 Roselawn, Detroit 4, Mich.

The above company announces a

NEW Sisal *Finger* Buff*



Sensational New-Type Construction

of CHURCHILL #20-RD **SISAL BUFFS**

*Offers Four **Exclusive** Advantages*

FINISHING ROOM FOREMEN REPORT . . . .

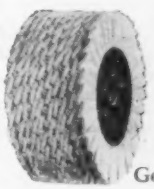
FLEXIBILITY never before achieved in a sisal buff!
In additional to the flexibility of each buff finger, the complete freedom of the sisal fibres within each finger gives the utmost in flexibility. With no spiral sewing, the Churchill #20-RD is ideal for work involving curved surfaces and recesses.

FASTER cutting action that's positively unbelievable!
This #20-RD is proving to be the fastest-cutting buff ever developed, because only the raw ends of each sisal fibre are in contact with the work and they pick up and *retain* the cutting compound better.

LONGER wearing qualities hitherto unequalled!
Many foremen have found the wearing qualities of the #20-RD to be unmatched by any other buff they have ever used. It is manufactured with first quality sisal twine only, which is specially processed and tightly twisted.

REMARKABLY smoother finish now possible!
Due to the exclusive use of imported combed sisal, the #20-RD produces a smoother finish that is not possible with ordinary sisal buffs.

Churchill #20-RD Sisal Buffs are competitively priced. Produced in all sizes from 6" to 18" diameters. Write for further information.



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Wheels CUT FASTER, LAST LONGER

When treated with Park KOLD-GRIP POLISHING WHEEL CEMENT

KOLD-GRIP Polishing Wheel Cement, laboratory-controlled through every step of production, will arrive at your plant *ready for use!* Viscosity is constant, regardless of normal temperature variations and the cement can be applied directly from the container . . . *without mixing or heating.* Kold-Grip is clean, odorless and very easy to handle.

Coarse or fine-grain abrasives set up right for fast cutting efficiency. Substantial savings are effected through longer over-all wheel life, fewer set-ups and reduced wheel inventory.

Wheels dry rapidly, are unaffected by humidity changes, and may be stored in any convenient plant area.

Let our polishing engineer demonstrate Kold-Grip for you, or send for free sample, telling us the metal to be polished, grain sizes to be used, and drying facilities available. We can help you if we hear from you.

• Liquid and Solid Carburizers • Cyanide, Neutral, and High Speed Steel Salts • Coke • Lead Pot Carbon • Charcoal • No Carb • Carbon Preventer • Quenching and Tempering Oils • Drawing Salts • Metal Cleaners • Kold-Grip Polishing Wheel Cement

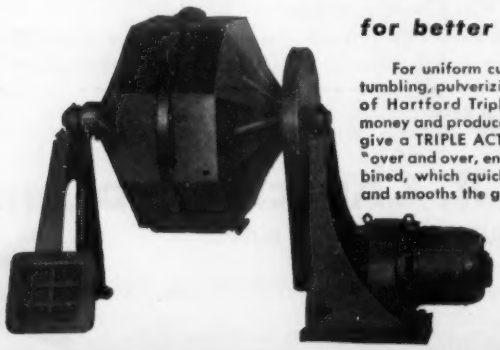
LICENSED MANUFACTURER: Electric Resistance Furnace Co., Ltd., Weybridge, Surrey, England

Park CHEMICAL COMPANY 8075 Military Detroit 4, Mich.

HARTFORD TRIPLE ACTION

CUTTING and TUMBLING BARRELS

for better work in less time!



For uniform cutting down, wet or dry grinding, tumbling, pulverizing and mixing, the unique design of Hartford Triple Action Barrels saves time and money and produces better results. Hartford Barrels give a TRIPLE ACTION in tumbling the material, an "over and over, end to end, folding-in" motion combined, which quickly grinds off burrs, and finishes and smooths the general surface of any article in the load. These barrels are available in two sizes, large and small, and with both motor and belt drive. Hartford also makes steel burnishing balls scientifically correct in design and material for each specific job. Bulletin on request.

THE HARTFORD STEEL BALL CO.

HARTFORD 6, CONN.

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new service to industry, the reconditioning and reprocessing of worn and damaged, smooth and rough plastic dipped cotton gloves.

The new service, designated as "Over-Kote," is available in practically all industrial areas through the corporation's Glovco National Service.

Thorough investigation and tests have proven that up to 90% of previously discarded gloves can be reclaimed and that the service is as practical and workable as that of reconditioning fabric and leather gloves with important savings possible to industry.

The new service, which includes cleaning, sterilizing, patching and repairing, reshaping, recoating, vulcanizing and pairing and which assures in most cases 100% reusability all at a small fraction of the cost of new gloves, should make the use of plastic gloves completely practical.

The company offers industry door to door pick up and delivery through 57 outlets in 20 states including some west of the Mississippi. The service cycle is about 2 weeks.

Firetron Flame Failure Safeguard

Combustion Control Corp., Dept. MF, 720 Beacon St., Boston 15, Mass.

Firetron scanner type 48PT1 which provides flame failure protection for gas, oil, pulverized coal or combination fuel burner installations has been introduced recently. The equipment guarantees instantaneous burner shutdown in the event of flame failure, thus providing a positive and immediate safeguard against the important and ever present explosion hazard.

Scanner type 48PT1 is used in conjunction with control type 26SJ5 for the protection of manually ignited burners and with programming control type 26RJ8 for the protection of automatically fired installations.

The eye of the scanner is the "Firetron," a revolutionary development in the combustion industry, which is a

photoconductive cell highly responsive to infrared. With its associated electronic circuits it distinguishes between the infrared of a flame and that of other sources of infrared. The tiny cell, hardly bigger than a pencil eraser, is plugged into the scanner unit which consists of a mounting for the cell and a length of cable for electrical connections. The single scanner views both the pilot and main flames and replaces both flame rod and photocell flame detectors. Firetron is the only flame failure safeguard which sees all flames—oil, gas, pulverized coal.

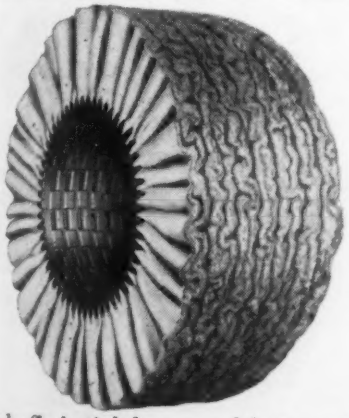
This scanner and its associated controls comprise the Fireye FP systems which carry the approval of Underwriters' Laboratories, Factory Mutual labs and Canadian Standards Association.

Centerless Buff Ring

American Buff Co., Dept. MF, 2414 S. La Salle St., Chicago 16, Ill.

This manufacturer claims that strength, precision and speedy buff assemblies are provided by the new, exclusive ring construction, a feature of the company's automatic centerless buffs. The rigid steel ring, which securely grips the buff cloth in its channel, is designed to retain its strength and perfect circumference under the most severe running conditions.

Pre-assembly of the automatic centerless buff is speedily accomplished with the use of 2 tubes, each one welded to the inside of an automatic buff flange. One tube is fitted telescopically into the other, and the set-up

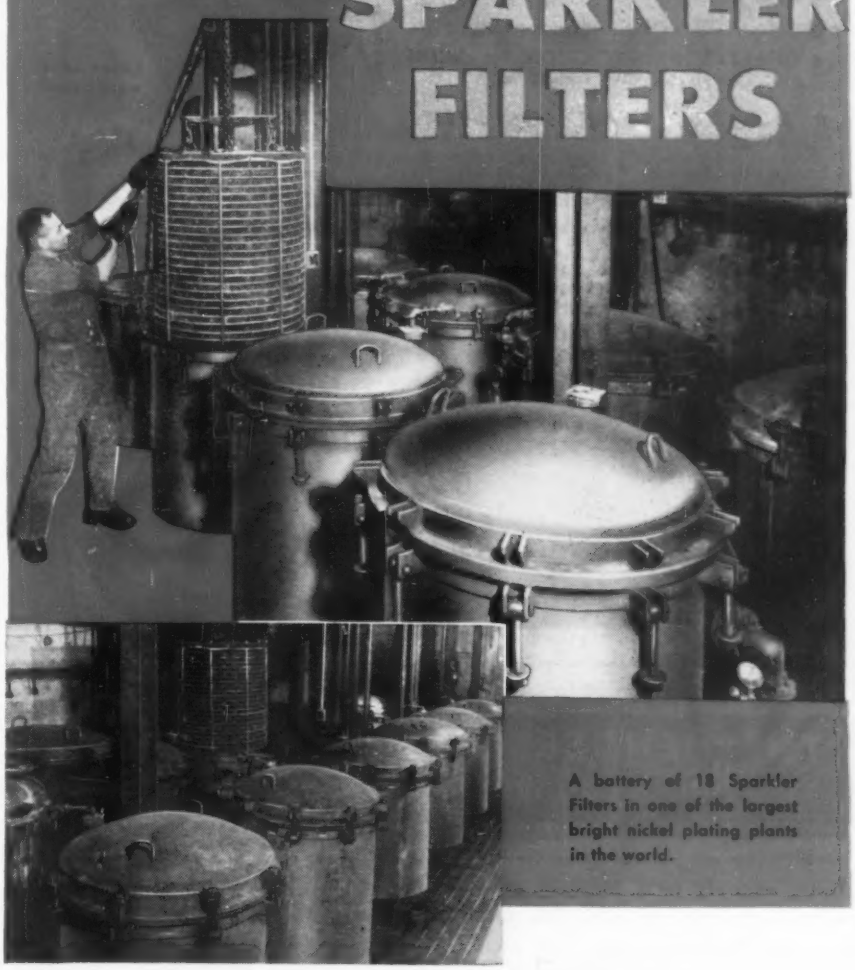


of buffs is tightly secured between the 2 flanges. The buffs are held together in a compact, non-shifting set-up by the automatic tight-locking rings.

Cool-running and long-wearing, automatic centerless buffs are "air-conditioned" throughout, according to the manufacturer. The regularly spaced

NO SHUT DOWN

To Carbon Treat Solution with SPARKLER FILTERS



A battery of 18 Sparkler Filters in one of the largest bright nickel plating plants in the world.

Carbon treatment without shut down is accomplished by cutting out one or two units in a battery of filters, removing the cartridge assembly of filter plates, and replacing with a new plate cartridge dressed with clean filter paper. The proper amount of carbon is mixed with water in a standby tank and recirculated through the filter thus depositing the carbon on the new plates in a cake of uniform thickness and density. The solution requiring a carbon treatment is then circulated through the carbon beds giving the plating solution the carbon treatment without contaminating the tank or stopping plating operations.

The quick change feature of the plate cartridge in Sparkler filters permits replacing a set of plates in a matter of minutes. Production can be resumed without appreciable interruption.

Sparkler Horizontal Plate Filters give absolutely sharp filtration at all stages of the cycle.

SPARKLER MANUFACTURING CO.
Mundelein, Illinois

SPARKLER horizontal plate FILTERS

BETTER-THAN-USUAL SERVICE

with

HENDERSON

WOOD TUMBLING BARRELS

- BEST GRADE MAPLE or other woods to specification
- GREATER THICKNESS for longer life
- QUALITY FABRICATION by skilled and experienced workmen

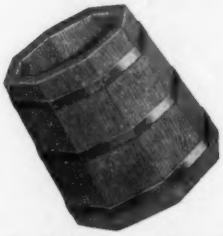
A SIZE AND SHAPE FOR EVERY PURPOSE

8 to 14 sided barrels — 14″ to 38″ in diameter
Round barrels — all sizes
Horizontal barrels — various shapes and sizes

SPECIAL BARRELS

Where finishing specifications call for a different type barrel, Henderson Bros. is prepared to construct special equipment for practically any purpose.
ALSO barrels in steel, stainless steel, brass, Monel Metal and other alloys.

Large sided wood barrel



Small sided wood barrel

Horizontal wood barrel

Round wood barrel

SINCE 1880 DESIGNERS and BUILDERS of Tumbling Equipment

THE HENDERSON BROS. COMPANY
135 SOUTH LEONARD ST. WATERBURY 85, CONN.

pleats, securely held by steel gripper teeth on the ring, radiate with perfect precision from a center, thus imparting a regular cooling action. Adjustable controlled ventilation is available with specially designed air vent plates, which fit into the flanges.

Fire Protective Parts-Cleaning Can

The Protectoseal Co., Dept. MF, 1920 S. Western Ave., Chicago 8, Ill.

A new plunger-type parts cleaning can is now available which can be attached to a bench convenient to the operator. The unit is a sturdy, terne plate, seam welded rectangular container measuring 10″ x 7″ x 8″ deep to permit washing of long narrow parts, small parts, and square or rectangular piece parts. It has a capacity of 2 gallons of solvent or cleaning agent and is equipped with a metal-perforated plunger dasher which completely covers the opening. Parts are placed on the conveniently located dasher as they come from the machine, pressure on the dasher submerges them in the solvent for quick removal of oil, grease and minute metal particles and upon release, the excess solvent drains down into the body of the container. A hinged cover which folds back against the container to be completely out of the way during use is closed when the machine is not operating to minimize or practically eliminate loss of solvent by evaporation.

An important feature is that the can is self-extinguishing. The dasher itself acts as a flame arrester, and in case of fire on its surface, the surface film

of the flammable solvent vaporizes, mixes with the air and burns off.

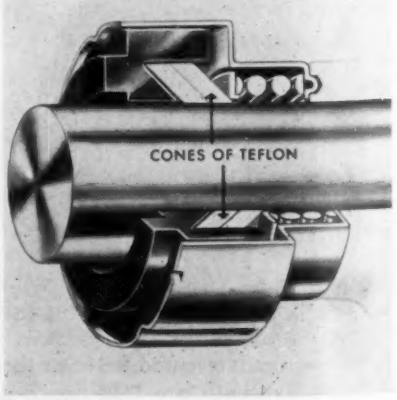
All-Purpose Shaft Seal

Crane Packing Co., Dept. MF, 1800 Cuyler Ave., Chicago 13, Ill.

A new all-purpose mechanical seal, completely proven in design and construction, has been announced by the company. Known as the "John Crane" Type 19, the seal is said to provide life-time performance in small pumps, hot water circulators, and many other rotary shaft applications.

Special beveled cones made of Teflon (DuPont Trademark for tetrafluoroethylene resin) are utilized as the flexible member. This adapts the seal for services involving water, oil, corrosives or acids; temperatures from −100° to +450°F.; vacuums and pressures to 200 p.s.i.; and high shaft speeds.

Being a packaged type unit, the



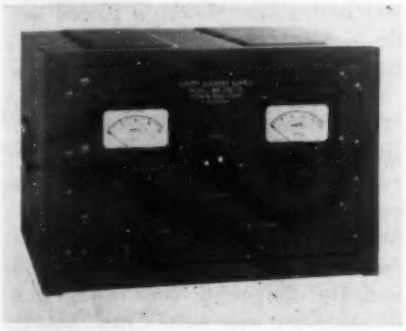
seal provides quick and easy installation for production assembly and replacement service. It is presently available in sizes to fit shaft diameters of ¼, ⅜, ½, ⅝ and ¾ inches. The metallurgy of the seal, bronze, stain-

less steel, etc., can be specified to meet service requirements or operating conditions.

Magnetic Amplifier Regulated Power Supply

Perkin Engineering Corp., Dept. MF, 345 Kansas St., El Segundo, Calif.

A new magnetic amplifier regulated power supply, designated as Model No. MR32-15, has been developed by the above company. This power supply is rated at 5 to 32 volts D.C. and 15 amperes continuously and features no tubes. In addition to a regulation accuracy of ± 1% for D.C. load variations from no load to full load the unit is also stabilized for A.C. line variations from 105-125 volts A.C. The ripple of this unit is 1% maximum. The unit is also provided with a 4½" ammeter and voltmeter and its maximum overall dimensions are 22"



wide x 17" deep x 14½" high. It is finished in grey wrinkle and its approximate weight is 125 pounds.

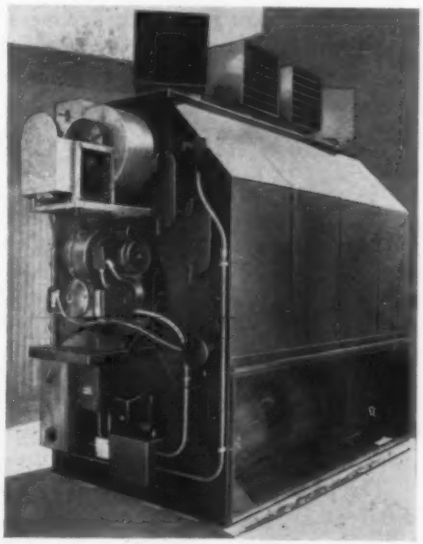
The unit is mounted in a bench-type cabinet which can also flexibly be utilized for 19" rack panel mounting. An additional feature to this power supply is that, in addition to the regular A.C. on-off switch, it is also provided with a magnetic type circuit breaker on the D.C. side with a time delay provision.

This unit is the first in a series of magnetic amplifier regulated power supplies to be developed by the company and further information and literature can be obtained by writing directly to the above address.

Automatic Heating Systems

National Heater Co., Dept. MF, 2182 Cleora Ave., St. Paul 4, Min.

A complete series of self-contained, automatically operated heating systems, designed for industrial and commercial construction, is termed the Model "H" by the manufacturer. The heating system is available in 12 sizes ranging in output from 200,000 to



2,000,000 B.T.U.'s. Four-way heat discharge heads and floor line return air grilles provide working level comfort by controlling the direction and extent of heated air circulation.

Heat exchangers on the model "H" are of welded, one-piece steel construction. Full chrome-nickel stainless steel firebox of teardrop design, streamlined headers and multiple convector tubes are enclosed in heavy insulated casing formed to heater contour. Design of the heat exchangers utilizes the direct flame-metal-air principle of heat transfer for maximum efficiency.

Units are designed for light oil, heavy oil, gas or combination gas-oil firing. Model "H" light and heavy oil-fired units are listed by Underwriters' Laboratories, Inc.

Here's a unique type of batch cleaning machine for all kinds of metal parts that enables you to fit the cleaning operation right into your production line. The cleaning job is so speeded up by the "up and down" motion of the work in the machine that in most cases the flow of parts through the machine is practically continuous from a production line viewpoint.

No Motors...No Gears...No Sprays

This Magnus Aja-Lif Cleaning Machine has NO motors... NO gears... NO sprays. It is powered by compressed air. Its compactness makes it easy to fit into limited floor space, and as there are no overhead conveyors or hoists, there is no head-room difficulty.

The Magnus Aja-Lif Cleaning Machine is fast and uniquely thorough in its cleaning action because the work itself moves up and down in the cleaning solution many times a minute, providing a mechanical "shearing" action on the dirt and chips, plus constantly agitated cleaning solution that works faster and better because of it.

Minimum Labor Costs

The Aja-Lif Machine loads and unloads at the top, at waist level. One lever lowers the load, starts the machine, cuts it off and raises the load at the end of the brief cleaning period. It's a one man job, with no supervision required during cleaning.

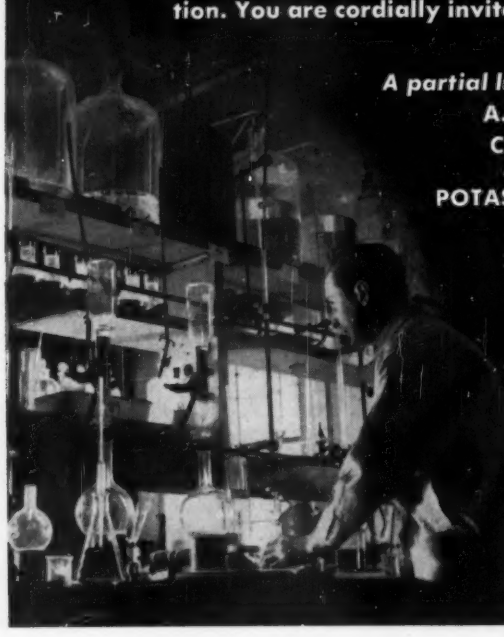
Write for BULLETIN 703AL

MAGNUS CHEMICAL CO. • 11 South Ave., Garwood, N. J.
In Canada — Magnus Chemicals, Ltd., Montreal.
Service representatives in principal cities.

Magnus
CLEANERS • EQUIPMENT • METHODS

To help solve your precious metal plating problems...

Alert manufacturers utilize the valuable experience and facilities of our Electrochemical Research Division to develop precious metal plating procedures that minimize cost and increase efficiency. This APW service is available to all manufacturers, without cost or obligation. You are cordially invited to use it—freely.



A partial list of APW plating products:

A.A. SILVER ANODES

C.P. SILVER NITRATE

Meets A.C.S. Specifications

POTASSIUM SILVER CYANIDE

SILVER CYANIDE

APW

Write for information and current quotations

THE AMERICAN PLATINUM WORKS

231 N.J.R.R. AVE.
NEWARK 5, N. J.

Manufacturers' Literature

Demineralization and Silica Removal by Ion Exchange

The Permutit Co., Dept. MF, 330 West 42nd St., New York 36, N. Y.

To help explain one of the newer roles that ion exchangers are playing in industry, a 28-page bulletin, Demineralization including Silica Removal by Ion Exchange, has been prepared.

Due to its extremely economical operating costs, as compared with distilled water, demineralization and silica removal through the medium of ion exchange resins has come into very extensive use in all phases of industry.

This new bulletin, 3803, describes the chief applications, principles of operation, design features, advantages, recommendations and specifications of Permutit's demineralizing and silica removal apparatus and synthetic resins.

Handy Reference for Defense Plants

E. F. Houghton & Co., Dept. MF, 303 W. Lehigh Ave., Philadelphia 33, Pa.

Plant men concerned with defense production will find the recently revised booklet, "Houghton Products Meeting Government Specifications" a helpful reference in the manufacture of items to Federal requirements.

The products meeting various specifications are conveniently listed under the following classifications: rust preventives, lubricants, cutting oils, metal working aids, and leather and synthetic rubber products.

One section of the booklet of unusual interest is the Government Preservative Compound Chart, based on MIL-P-116A, which contains descriptive and application details of P-1 to P-17 preservatives.

Distribution of the new booklet is limited to defense plants and various Federal agencies, which can obtain copies from the company.

Demineralizer Catalog

Penfield Mfg. Co., Inc., Dept. MF, 19 High School Avenue, Meriden, Conn.

Penfield's new MA Model demineralizers operate on the extremely efficient and economical *mono-column* method: cation and exceptionally strong anion exchangers intimately mixed in a single unit tank through which the raw water is passed only once. The company has published a catalog sheet describing this apparatus.

The *special feature* of the new MA Model is the *completely automatic performance of all functions, including the regeneration cycle.* Whenever the effluent's conductivity (purity) falls below pre-set standard, the treated water is automatically discharged and signals indicate the need for regeneration. Turning but one switch then puts the unit into its complete regeneration cycle, including rinsing and re-cutting in effluent when desired purity standards are reached and refilling regeneration tanks with fresh water in preparation for the next required regeneration cycle. As can be readily appreciated, this fully automatic feature contributes important savings of operating time, trouble and money while also insuring highest efficiency performance.

Nickel Immersion Coatings

The International Nickel Co., Inc., Dept. MF, 67 Wall St., New York 5, N. Y.

A 4-page review of the relative advantages and limitations of two non-electrolytic nickel-coating processes, the displacement and the "electroless." They are shown to be not competitive with each other or with electroplating. The operation of the processes, the nature of the deposits, physical properties, protective value, efficiency and potential applications are discussed. The displacement method is limited to coating under 50 millionths inch on iron or steel bases and is visualized

as an inexpensive way of making a superior base for other coatings. The "electroless" process is suggested where such advantages as uniform coatings of several mils to a variety of bases regardless of shape, including intricate interior surfaces, will justify the cost. No heavy capital investment is needed. Under certain conditions the deposit is non-magnetic, and where high hardness is desirable it may be heat treated.

Rubberized Abrasives

Cratex Manufacturing Co., Dept. MF, 81 Natoma St., San Francisco 5, Calif.

Presenting the adaptability, versatility and application of Cratex rubberized abrasives, together with complete specifications and prices is the interesting content of a new catalog just issued. The catalog, No. 53, contains a most complete and comprehensive treatise about rubberized abrasives on burring, smoothing and polishing operations and their use in industrial establishments.

Wire Cloth Belt Catalog

Cambridge Wire Cloth Co., Dept. MF, Cambridge, Maryland.

The above company has issued a new and greatly revised catalog for its wire mesh conveyor belts.

Totaling approximately 140 pages, the new catalog gives data on uses for wire mesh belts including photos and flow sheets, selection of belt specifications, conveyor design, belt drive mechanisms and metallurgical tabular data. In many ways the new catalog can more correctly be considered a reference manual of wire mesh belt design and use since it includes more of this type of data than previous versions.

Copies may be obtained by writing the manufacturer direct.

Industrial Maintenance

Wheeler Associates, Inc., 15017 Detroit Ave., Cleveland 7, O.

This booklet details such vital topics as "How To Keep Equipment, Methods and Facilities In Top Operating Condition"; "A Guide To Organizing An Industrial Maintenance Program"; "Check List For Machinery"; "Maintenance Of Methods"; "Plant Facilities"; and "Physical Environment." The literature covers the features of lighting, air conditioning, color painting, noise conditioning, vibration control, plant architecture and good housekeeping. The details of employee operating efficiency, worker health and comfort, and employee morale can also be obtained.

In addition to the descriptive portion of the booklet, a highly valuable maintenance check list is designed to aid in evaluating a company's existing maintenance program.

Copies of this free literature may be obtained by writing the above company. Copies of the booklet "Material Handling" are also available upon request.

Multiple Unit Tumbling Barrels

Tumb-L-Matic, Inc., Dept. MF, 4510 Bullard Ave., New York 70, N. Y.

Tumb-L-Matic, Inc., New York, N. Y. offers a new bulletin, MU-52, on its line of multiple unit tumbling barrels for high-production deburring, cutting, and finishing of wood, plastic, and metal parts.

The bulletin explains how several barrels mounted on one frame are driven by one motor and how any one barrel may be stopped for emptying or filling without interrupting the operation of the others It gives information on drive, sizes, and types and includes pictures of horizontally-mounted and vertically-mounted models.

A table of specifications lists standard model numbers, dimensions, number of tumblers per frame, and number of compartments per tumbler. Tumblers are available for wet or dry tumbling or a combination of both.

The mirror of one's mind is often our fondest desire

Reflect on this...

In producing a mirror finish for bright plated or non-plated work, that *reflects* maximum depth—*SIEFEN'S BUFFING NU-SPRA-GLU* and *SIEFEN'S TECHNICIANS* have the know-how for you. Why not investigate these superior products and service? We act promptly on all inquiries.

TRY US.

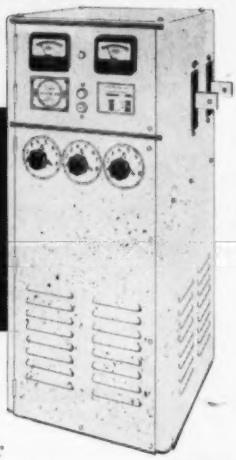
J. J. Siefen CO.

5643 LAUDERDALE · DETROIT 9, MICH.

RICHARDSON ALLEN RECTIFIERS

an unfailing D-C SUPPLY for quality plating

ANNOUNCING
PERIODIC REVERSE
You may now obtain a R-A Periodic Reverse Unit for electroplating generators, and one for electroplating rectifiers up to 2,000 amperes.

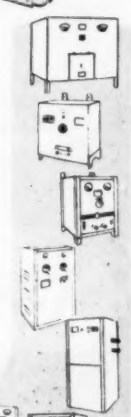


For increased production, improved quality, fewer rejects, lower labor costs—which translates into higher profits—use Richardson-Allen dependable rectifiers.

The basic R-A Rectifier is widely used where a single voltage or current is needed or where several rectifiers are to be paralleled.

For electroplating chrome or bright nickel a 22-position tap switch is supplied. For electroplating gold or silver, and for anodizing a 36-position tap switch is used.

A special Heat Exchanger unit is available for use in corrosive atmospheres. This R-A development permits operation at elevated ambient temperatures with a minimum temperature rise. Long, uninterrupted, dependable service is assured.



write for descriptive literature

RICHARDSON-ALLEN CORPORATION
a manufacturing affiliate of
WESLEY BLOCK AND COMPANY, 39-15 MAIN ST., FLUSHING, N. Y.
IN CANADA: Richardson-Allen of Canada, Ltd., 370 Victoria St., Toronto, Ont.

LEADING POWER CONVERSION SPECIALISTS

The bulletin also includes a section on the Pocket Tumbler, a barrel divided into a number of separate pockets for carrying out multiple finishing operations in one barrel.

The bulletin contains recommendations on the right compounds to use for various operations in both wet and dry tumbling.

New Guide Shows How to Combat Corrosion

Tapecoate Co., Dept. MF, 1523 Lyons St., Evanston, Ill.

A new illustrated brochure designed to help solve corrosion problems has just been released. Based on the company's experience in serving the gas and oil fields, transportation and communication, water and sewage and chemical and industrial applications, the brochure presents practical suggestions to combat corrosion. It includes details on how and where coal tar protection can be used to best advantage and offers case histories to show how corrosive problems have been overcome in many fields.

Simple Recorder Controller

The Foxboro Co., Dept. MF, Foxboro, Mass.

A 16-page illustrated bulletin just issued by this company, describes the restyled Foxboro Circular Case Controller. This instrument, familiar throughout the industrial world, has been selected for more than 50,000 installations, to automatically control temperature, pressure, liquid level, humidity or other process variables.

Showing typical applications in the metal and ceramic industries, the bulletin discusses each unit of a pneumatic control system, from the measuring element to the control valve. A section of installation diagrams and text is devoted to on-off and proportional control, explaining how to select the appropriate controller action to match the demands of a process. Instrument components and their individual functions in the control of such equipment as storage type heaters and refrigerators, retorts, kettles, kilns and dryers are thoroughly covered.

A two-page data section analyzes the four classes of measuring systems available for automatic temperature control, illustrating a variety of temperature bulbs, sockets, flanges and other accessory equipment. Measuring elements for automatic pressure control are also shown. Other pages feature indicating controllers, Rotax electric controllers, chart records, instrument specifications and mounting dimensions.

Copies of new Bulletin 465 will be sent on request to the above address.

Belt Conveyor Bulletin

The Rapids-Standard Co., Inc., Dept. MF, 342 Rapistan Bldg., Grand Rapids 2, Mich.

A new, four-page illustrated bulletin detailing applications and specifications of the Rapistan Floor-Veyor belt conveyor has just been issued by the company. The two-color folder has photos and descriptions of typical uses and features of the belt unit, which is used to move goods from floor to floor or horizontally in many types of industry.

The bulletin presents specifications and features of the Floor-Veyor in clear, easy-to-read chart and table form. Sketches are used to show recommended installation procedures and to point out each part of the unit.

Free copies of the new Floor-Veyor literature may be had by writing to the above address.

Pneumatic Butterfly Valves

Minneapolis-Honeywell Regulator Co., Brown Instruments Div., Dept. MF, Station 64, Wayne & Windrim Aves, Philadelphia 44, Pa.

A 4-page bulletin, No. 8503, describes a line of butterfly valves for regulating the flow of air, gas, liquids,

or steam in conjunction with indicating pneumatic controllers.

Application data, specifications, dimensions, and sizing data are given, together with information on types of pneumatic operators.

Fine-Grain Brass for Economical Finishing

The American Brass Co., Dept. MF, Waterbury 20, Conn.

A 12-page booklet on "Formbrite," has been released by the manufacturers. This metal is stated to be stronger, harder an dspringier than the usual drawing brasses, yet retains remarkable ductility for forming and drawing and takes sharp, clean-cut ornamental die impressions. It is said to have a surface superior to ordinary drawing brass and was developed for applications where the metal is to be formed or drawn into products on which finishing is an important cost factor.

The publication, B-39, lists physical properties, and contains helpful information on pressroom and finishing room procedures. Case histories of this relatively new metal are reported to show how applications have contributed to better finished products at lower production costs.

Abrasive Blasting Literature

The Cro-Plate Company, Inc., Dept. MF, 747 Windsor St., Hartford 5, Conn.

The above company announces the availability of a special combination packet of technical and promotional literature designed to show 29 specific ways in which the costs of deburring, descaling, micro-inch surfacing and general metal finishing operations may be reduced through the use of high velocity wet-blasting equipment and appropriately compounded pressure blast abrasives. The packet consists of a list of 29 customer-proven applications, a description of the equipment and a cross-indexed return post card for those readers desiring more detailed information regarding particular applications, listed or unlisted.

Protective Coatings—Applications and Methods of Use

Magic Chemical Co., Dept. MF, 121 Crescent St., Brockton, Mass.

A new, revised catalog of the company contains complete details about Magic-Vulc anti-abrasion and anti-corrosion plastic rubber coatings.

Prepared in easy-to-read outline form, the catalog contains important facts about protective coatings and their many industrial and other applications. The use of Magic-Vulc to repair conveyor belts and to protect industrial equipment from corrosion and abrasion is fully described. A complete list of these coatings and their uses is contained in the front section of the catalog. Other sections outline the various industries where the coatings are useful, and the types of industrial equipment which it is especially suited to protect. Detailed instructions of use are included.

Copies of the catalog may be obtained by writing the above company.

New Rotoblast Bulletin

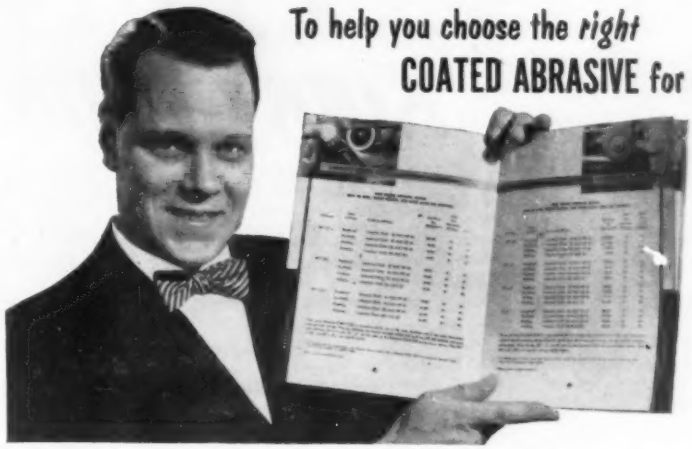
Pangborn Corporation, Dept. MF, Hagerstown, Maryland.

The availability of a 12-page, two color Bulletin No. 223 on the new Blastmaster Rotoblast has been announced. Showing the new "GN" Barrel, the bulletin illustrates the eight exclusive construction features that make this new machine especially attractive to the foundry and metal finishing fields.

In addition, other pages of the bulletin show how production savings may be realized by taking advantage of the Blastmaster. Detailed dimensions and specifications, for both the 6 and 12 cu. ft. models, clearly show

IT'S YOURS...FREE!

To help you choose the *right* COATED ABRASIVE for every job!



30 HELPFUL PAGES... covering

Metalworking: *Hand and machine operations.* Portable, disc sanding; contact wheel, platen, and slack-of-belt grinding—wet and dry.

PLASTICS, CERAMICS, GLASS AND OTHER NON-METALLIC MATERIALS

Woodworking: *Hand and machine sanding and finishing;* machine sanding of all types; portable belt sanding machines.

In addition you'll find full information on contact wheels of all types, and on the economical "61" Port-A-Belt grinding attachments.

With this new catalog you can easily select the right belt, disc, or cut sheet for any machine or hand abrasive operation—on metals, non-metallics, or wood.

The recommendations given are *complete*—including grain sizes and types, backings, coatings, product sizes, prices and packaging information. You'll also find a useful section telling who manufactures machines used with coated abrasives, and listing model numbers and belt sizes.

Send for copy today!

THE CARBORUNDUM CO., Dept. MF 82-39
Niagara Falls, New York
YES! Send me the new COATED ABRASIVE SELECTOR—Catalog No. 70.

NAME TITLE

COMPANY

STREET AND NUMBER

CITY ZONE STATE

CARBORUNDUM
TRADE MARK

the ONLY source for EVERY abrasive product you need

"Carborundum" and "Port-A-Belt" are trademarks of The Carborundum Company, Niagara Falls, New York

82-304

Compact... Efficient... Automatically Controlled

GAS, STEAM OR ELECTRIC OVENS BY

KIRK AND BLUM

Your oven needs . . . large or small, batch or continuous production, for drying, baking or dehydrating . . . can be filled by KIRK & BLUM.

The small oven illustrated is shipped completely assembled, thoroughly tested and ready to operate. Installation is a one-two process: Spot in place . . . make connections . . . and you're ready for production.

Write for booklet, "Industrial Ovens," showing typical installations.

THE KIRK & BLUM MANUFACTURING CO.
3159 Forrer Street
Cincinnati 9, Ohio

Electric laboratory type oven used by noted resistor manufacturer in making TV set components. Uniform drying heat is provided by recirculation of air provided by blower and heaters enclosed in base.

how this barrel can fit into a cleaning room operation.

Flexible Tubing Catalog

Flexible Tubing Corp., Dept. MF, Guilford, Conn.

Flexible tubing for ventilation, fume and dust removal, and materials handling is described in a new 8-page bulletin. Catalog C2-4 gives detailed information on Spiratube A and Spiratube R, two types of highly flexible lightweight tubing made from continuous helical coils of spring wire wound with overlapping plies of specially-treated multi-coated fabric. Spiratube A is designed for ventilation, dust removal, fume disposal, and similar applications—either blowing or exhausting. Spiratube R, has built-up extra thicknesses of rubber, Neoprene, or other polymers.

The catalog also describes Flexflyte, smaller-diameter tubing for the same uses as Spiratube. It contains detailed specifications, air friction charts, data on oil and chemical resistance, and application information.

Plant Layout Booklet

Wheeler Associates Inc., Dept. MF, 15017 Detroit Ave., Cleveland 7, O.

The third in a series of valuable booklets designed for administrating and operating executives of industry, "Plant Layout" is now available from the above consulting engineering firm.

This booklet which was preceded by ones detailing the subjects, "Material Handling" and "Industrial Maintenance," cover such important phases as The Work Area, How to Develop a Better Layout, Layout Planning, Work Area Planning, and Basic Principles of Good Layout.

Two pages of the booklet are devoted to an Improvement Check Sheet which poses more than two dozen questions which are designed to aid in evaluating a company's existing layout.

Blast Cleaning Hot-Rolled Steel Strip

American Wheelabrator & Equip. Corp., Dept. MF, 1150 S. Byrkit St., Mishawaka, Ind.

Descaling hot-rolled steel strip at high speeds and low cost by means of airless blasting is the subject of the company's new bulletin 894.

Detailed descriptions of the airless blasting equipment and its operation at two prominent steel mills are presented. Both are illustrated. The bulletin describes how airless blasting eliminates scale breaking, permits descaling at production line speeds of from 190 to more than 400 feet per minute (depending upon the number of abrasive throwing units used), reduces the use of pickling acid, reduces manpower and space requirements, and saves metal (since airless blasting removes scale only).

Dehumidifier Catalog

Westinghouse Sturtevant Division, Dept. MF, 200 Readville St., Hyde Park, Boston 36, Mass.

A 32-page catalog giving the complete story on surface dehumidifier units used to control humidity in large commercial and industrial buildings is available from Westinghouse.

Five pages are devoted to details of construction of the dehumidifiers along with discussions on how surface cooling and evaporative cooling are put to work in the units. As an introduction to the thorough instructions on how to select the correct unit, a set of typical specifications is presented. The booklet then presents a tested procedure for determining the size, giving all the formulae, unit data, psychrometric data, and coil data necessary to the calculations. Three sample problems are worked out as an aid in explaining the procedure. The latter part of the catalog gives all the information necessary for installation and erection of the dehumidifiers — the outline dimensions, net weights, and erection instructions.

New Bulletin Describes Metal Finishing Products

Pramat Division, Poor & Co., Dept. MF, 351 S. Market St., Waukegan, Ill.

A four-page bulletin provides a condensed description of the company's zinc, cadmium, copper and white alloy plating baths.

Also described are secondary chromate treatments to render magnesium, aluminum, zinc and cadmium surfaces more corrosion resistant and/or paintable. Addition agents for metal cleaning baths are also listed. Copies of the bulletin are available upon request to the manufacturer.

Buffing Compound and Greaseless Compound Bulletins

Apothecaries Hall Co., Dept. MF, Waterbury 88, Conn.

Bulletin B-1 describes a stainless steel buffing compound. The firm offers a new line of grease-type bars containing high grade, pure abrasives. A table gives the number of the compounds, characteristics and application.

Bulletin B-2 covers greaseless compounds for finishing metals, wood and plastic. They lead directly to lacquering or final buffing without cleaning, thus saving final buffing and coloring time.

Further information on both of the above bulletins may be obtained directly from the manufacturer.

Cleaning & Paint Stripping

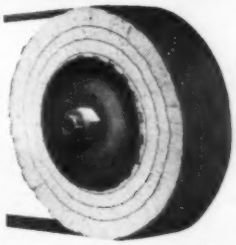
Whitfield Chemical Co., Dept. MF, 14225 Schaefer Highway, Detroit 27, Mich.

A new catalog on industrial chemicals and processes is announced. This illustrated catalog contains complete data on cleaning of metal surfaces and assemblies, preparation for painting, and stripping organic finishes.

It describes in detail the various processes used for (1) Removal of paint coatings from rejected parts and work hangers, (2) Removal of oil, grease, buffing compound, drawing compound, abrasives, chips, before painting, plating, assembly, etc., (3) Removal of oil, rust, and scales. Formation of rust inhibiting phosphate coating before painting, (4) Industrial maintenance and cleaning for repair.

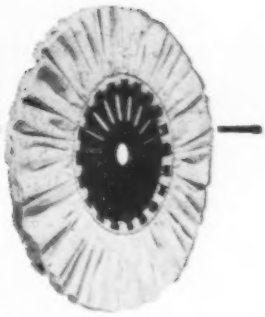
Further information on these chemicals and processes or copies of the catlog may be obtained from the above manufacturer.

A FEW OF THE MANY
FORMAX
PRODUCTS



STYLE C-20
CONTACT WHEELS
and F-26 Belt Lubricant

A C-20 flexible Contact Wheel will form itself to the shape of the work and permit the abrasive felt to polish contoured surfaces and F-26 Abrasive Belt Lubricant will increase belt life by preventing loading and glazing. Produces finer, smoother and brighter surfaces through lubrication.



ZIPPO BUFFS

These famous long-wearing buffs run cool under all buffing conditions. Constructed of high count bias-cut cloth or sisal mounted on safe steel centers. Available in a wide range of densities and center diameters.

A complete line of buffing compounds in bar form as well as in liquid form for brush or spray application. Also Flex-A-Glu polishing wheel cements.

Our Laboratory and Sales Engineering staff would welcome the opportunity to be of help in solving your finishing problems.

Send for descriptive literature

FORMAX MFG. CORP.
DETROIT 7, MICHIGAN
"THE FOUR McALEERS"

MANUFACTURED IN CANADA BY JOHN GALLOWAY LTD., KITCHENER, ONT.

BUSINESS ITEMS

Division Lead Buys Eagle-Picher Metallic Products Division

Joseph A. Stone, executive partner of the *Division Lead Co.,* 836 W. Kinzie St., Chicago, recently announced their purchase of the *Eagle-Picher Co. Metallic Products Division* plant at Argo, Ill.

According to Mr. Stone, equipment and personnel of the Metallic Products Division will be retained and immediately absorbed into the combined operation.

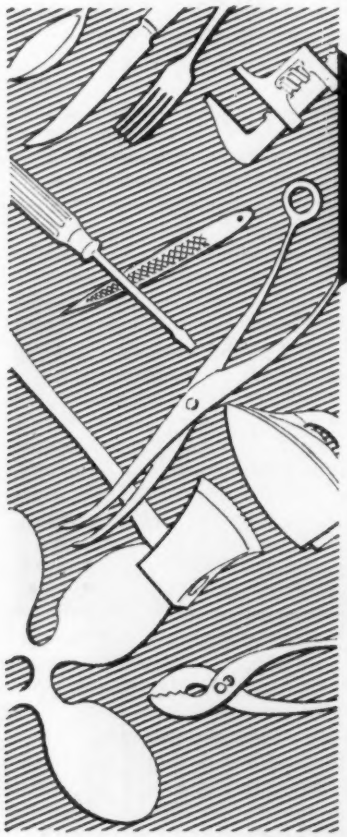
Division Lead's present plant—two buildings extending along W. Kinzie from Green St. to Peoria—is scheduled to become primarily a distribution center, with portions of the space given over to increased industrial research. Most other phases of work will be transferred to Argo, department by department, during 1953. Additional space now available at Argo is estimated at 100,000 square feet, with brick buildings housing both production and warehouse facilities. The present office space will be doubled as soon as construction can get under way.

Globe Compound Completes New Plant

The Globe Compound Co. announces the completion of their new factory

EXTREME *Versatility*

for Lower Finishing Costs



CLAIR
SURFACE FINISHING
MACHINES

A versatile Clair Surface Finishing Machine may be the answer to economical, production-quality surface finishing of your products. Combining the "touch" of the old time craftsmen with extreme versatility and high speed production, Clair Surface Finishing Machines are soundly engineered and ruggedly built.

By cooperative counsel between your engineers and Clair designers, custom surface finishing equipment may be developed to give maximum efficiency and economy on your metal finishing operation.

May we show how Clair Surface Finishing Machines can save money for you? Write for technical data.

CLAIR
MANUFACTURING CO., INC.
SPECIALIZED MACHINE EQUIPMENT FOR GLAZING AND POLISHING OPERATIONS
OLEAN, N. Y.

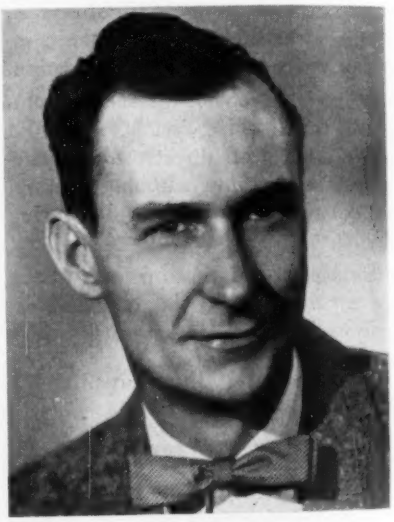
and office building at Waterbury-Bristol Road, Route 69, Wolcott, Conn. This modern fireproof structure affords greatly expanded facilities for production, laboratory research and technical services in the field of buffing compositions.

Many novel features in building construction have been incorporated to provide for future expansion and operating conveniences. Ceilings are constructed of insulated prefabricated cement slabs and floors are clear of all posts. Lighting fixtures are mounted on tracks and can be moved to any location. Salesmen calling on Globe Compound Company have been given the convenience of a wash room in the outer lobby.

Robert Feigin has been engaged as technical director of the organization. Mr. Feigin was formerly chief chemist in charge of application research, technical service and formulation at the *Alrose Chemical Co.*, Providence, R. I.

The Globe Compound Co. will undertake a comprehensive program in the further development of buffing compositions for metals and plastics and of related products for metal finishing applications, as a further step in its expansion. Custom formulation of buffing compositions to meet individual industrial requirements will also be promoted.

Wagner Brothers Appoint Indiana Representative



Bert Hawhee

Wagner Brothers, Inc., Detroit manufacturers have announced the appointment of *Bert Hawhee* as sales representative for their Indiana territory. According to *O. H. Tiedeman*, vice-president in charge of sales, Hawhee will handle the entire Wagner line of plating and polishing supplies and equipment. He will locate in the newly established office at 3016 North Illinois St., Indianapolis, Ind.

For the past 15 years, Mr. Hawhee has been associated with leading plating manufacturers. During the war he served as a naval instructor. Upon his return to civilian life he became a supervisor of a color anodizing department before transferring into sales in 1949.

Aceto Moves to New Plant

Aceto Chemical Co., Inc., has moved its laboratory and offices to 40-40 Lawrence St., Flushing 54, N. Y.

The new plant has considerably more area than their former Manhattan location, permitting same day shipment of small and intermediate-sized orders. Bulk shipments will continue to be made from their Manhattan warehouse as heretofore.

Simonds Abrasive Appoints Hemsley Chicago District Manager

Simonds Abrasive Co. announces the appointment of *William S. Hemsley* as Chicago district manager, with headquarters at branch office and warehouse located at 3323 W. Addison, Chicago 18, Ill., replacing *W. E. Byrne*, recently deceased.

Mr. Hemsley entered the employ of the company in 1943, advancing to the position of manager, Mounted

William S. Hemsley

Point Department at the factory in Philadelphia until 1946 when he was transferred to the Indiana territory as sales representative, with headquarters in Indianapolis. He brings to his new assignment in Chicago a background of manufacturing experience and a successful record of sales achievement.

A. F. Bodine, formerly with Central Rubber & Supply Co., Indianapolis, has been appointed sales representative for the Indiana territory replacing Mr. Hemsley in that location.

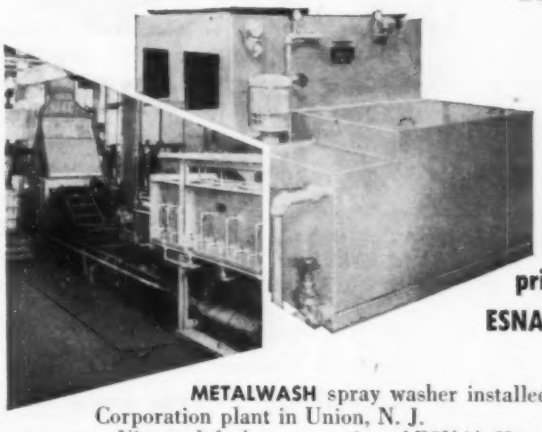
New Steel Shot Plant in Mishawaka, Ind.

American Wheelabrator & Equipment Corp., Mishawaka. Ind., has just completed construction of a new plant specially designed for the manufacture of Wheelabrator steel shot, a new blast cleaning abrasive produced under the company's patented process.

The plant, which is now in operation, is the largest of its kind in the world. It is completely mechanized and is equipped with electric melting furnaces and automatically controlled heat treating equipment to assure constant uniformity of product.

American Wheelabrator Steel Shot Plant.

productive WASHER installation



#2744

for cleaning prior to tempering of ESNA* self-locking nuts

METALWASH spray washer installed at Elastic Stop Nut Corporation plant in Union, N. J.

View at left shows a portion of ESNA's Heat Treating Department. Self-locking nuts are conveyed through two American Gas Reciprocating Furnaces into AGF conveyorized quench tanks. Mesh conveyors carry the work into **METALWASH** hot spray washer where quenching oil is removed prior to tempering.

METALWASH machine conveys the work directly into continuous tempering unit (not visible in photo).

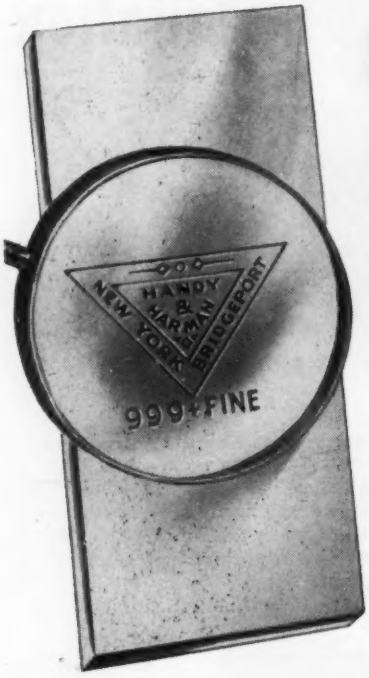
*ESNA is the registered trade mark of Elastic Stop Nut Corp. of America.

METALWASH *Finishing Engineer*, a new quarterly publication, is available on request to engineers and executives to whom cleaning and finishing are operations of interest. Please write us on your company letterhead if you are interested in receiving the **METALWASH** *Finishing Engineer* regularly.

metalwash MACHINERY CORPORATION
915 North Avenue · Elizabeth 4, N. J.

representatives in principal cities

How to cut your SILVER PLATING costs



Use the silver anodes that bear this stamp

It's the stamp you find only on Handy & Harman 999 "Plus" Fine Silver Anodes . . . the stamp that guarantees . . . (1) highest possible standards in fineness . . . (2) best physical properties for plating . . . (3) complete freedom from impurities that can cause plating troubles . . . the reasons why you are sure of trouble-free, low-cost, profitable plating when you use Handy & Harman 999 "Plus" Fine Silver Anodes. Try them and see.

HANDY & HARMAN

HANDY & HARMAN FOUNDED 1867 QUALITY · SERVICE

82 FULTON STREET · NEW YORK 38, N. Y.

Bridgeport, Conn. · *Chicago, Ill.* · *Los Angeles, Cal.*

Providence, R. I. · *Toronto, Can.*

Ray E. Greiner now Director of Purchases at Speer Carbon

Ray E. Greiner has been appointed director of purchases for *Speer Carbon Co.*, St. Marys, Pa., and its divisions. Mr. Greiner has been with Speer for 10 years and has been the purchasing agent for the International Graphite and Electrode Division for the last eight years.

Siefen Transfers Sayers

J. J. Siefen Co., manufacturers of liquid buffing and polishing compound, have transferred *C. A. (Red) Sayers* to 1981 Seymour Ave., Cincinnati 37, O., to cover the southwest section of Ohio. Mr. Sayers has 15 years' experience in the polishing and buffing industry and was formerly Siefen salesman in Indiana and Ohio.

C. A. Sayers

E. M. Close New Purchasing Agent at Hanson-Van Winkle-Munning

E. M. Close

The Hanson-Van Winkle-Munning Company, Matawan, N. J. announces the appointment of *Edwin M. Close* to the position of purchasing agent.

Close joined the sales department of the company in 1941. During World War II he headed the priorities department and upon cessation of hostilities became supervisor of terminations. In 1945 he was appointed assistant secretary of the company and subsequently was made assistant purchasing agent.

He has served as a member of the Cadmium Advisory Committee and the Electroplating Equipment Committee at NPA during the Korean Emergency.

He has a B.S. in Business Administration from Lehigh University and has completed graduate work there.

Century-Old Brooklyn Firm Building Plant in Westbury

John Hassal, Inc., producers of special nails, rivets, screws and cold-headed products of high quality, has announced plans for the construction of a new plant in Westbury, L. I. *Theodore B. Smith*, president of the 102 year old Brooklyn firm, says that manufacturing operations in the new building are expected to begin about August 1 of this year.

Waldberg Again Visits U. S.

Andre Waldberg, Director of *Waldberg S. A.*, leading French manufacturers of finishing systems and supplies, was recently here on his annual

visit looking for new lines to be manufactured in France under arrangements with American firms. Mr. Waldberg made his headquarters while here with Finishing Publications, Inc. His address is Waldberg S. A., 52 Avenue

Andre Waldberg

Presidente Wilson, Puteaux, Seine, France.

Cambridge Wire Cloth Opens New Territory

The Cambridge Wire Cloth Company, Cambridge, Md., has opened a new southern sales territory with headquarters at 333 Candler Building, Atlanta, Ga.

James M. Evans, formerly with Devoe Reynolds Paint Co., has joined the Cambridge sales staff to handle both sales and service work in the new territory from the Atlanta office. The southern territory includes the following states: North and South Carolina, Georgia, Florida, Alabama, Mississippi, and parts of Tennessee.

The new territory was opened so that manufacturers in this fast-growing industrial area can obtain direct factory service on industrial wire cloth, wire mesh conveyor belts and fabricated alloys manufactured by the company.

Rubinstein on Foreign Tour

Marvin Rubinstein, metal finishing engineer and consultant, has recently started a six-month study tour of electroplating and related installations in Cyprus, Turkey, Greece, Yugoslavia, and all of Western Europe, prior to his return to the United States next August.

During the past 2½ years, Mr. Rubinstein has served as a consultant

PROVEN ABILITY HAS MADE THIS MAN A MEMBER OF THE PRODUCTION TEAM OF

Morse Chain Division
Borg-Warner
General Electric Co.
Elmira, Schenectady
Delco Appliance Division
G.M. Corp., Rochester
Rochester Products Division
General Motors Corp.
Eastman Kodak Co.
Oneida Limited
Marlin-Rockwell Corp.
Crouse-Hinds Co.
International Harvester Co.
Hamilton, Ont.

LYN WELLS
Western New York Representative
of N. Ransohoff, Inc.

At your service if you are located in his territory.

Lyn Wells, in cooperation with the widely experienced Ransohoff engineering staff, has played a big part in "tailoring" Ransohoff equipment and methods to efficiently serve specialized needs of many of America's leading metal processors. Lyn ideally personifies the Ransohoff policy of offering outstandingly able and truly helpful field-counsel service.

N. RANSOHOFF, inc.
EQUIPMENT FOR THE SURFACE TREATMENT OF METAL
5819 VINE STREET • CINCINNATI 16, OHIO

Marvin Rubinstein

to the government of Israel on problems of corrosion resistance and heavy metal build-up, with particular reference to aircraft and armament parts. In the course of this work, he has supervised the erection of a number of plants for both government and private industry.

While on route through Europe, he may be contacted at American Express, 11 Rue Scribe, Paris, France.

McCoy Joins Stutz Mfg.

Mr. G. E. Stutz, president of the *George A. Stutz Mfg. Co.*, 1631 Carroll Ave., Chicago 12, Ill., announces the appointment of *E. H. McCoy* as sales and service engineer, replacing *E. N. Robinson*, who resigned.

Mr. McCoy was previously associ-

All chemists wear white coats!

Unlikely and unimportant but even if they look alike there's an important difference between them. KLEM chemists have dealt with almost every conceivable problem in their field. Their extensive experience enables them to more readily comprehend plant situations than ordinary chemists. The KLEM laboratory, equipped with the finest technological equipment for duplicating exact plant conditions and procedures, enables them to determine the correct answer to tough problems.

Let us help eliminate your bottlenecks, assist you as we have others in establishing profitable production schedules.

Representatives in most industrial areas.

3 OF 20 STANDARD KLEM PRODUCTS

KLEM STRIPPER No. 73—Heavy duty hot stripper for paint and enamels, rinses easily, eliminates hand scrubbing.

WATER WASH COMPOUND No. 203—Stops corrosion, keeps lines clean, prevents adhesion of paint to water curtain. Excellent for recovery.

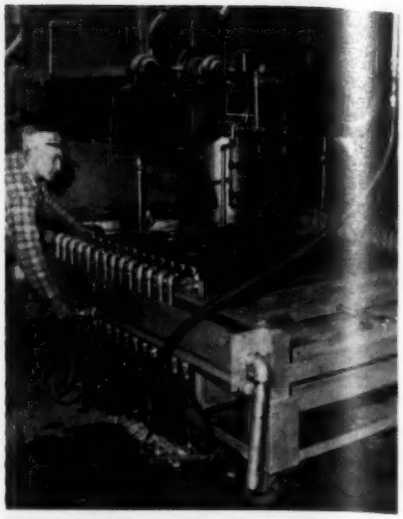
RUST-SOL No. 124—Concentrated phosphoric acid surface conditioner. Removes oil and rust. Provides slight etch to promote adhesion of paint. Meets USA 3-213, TAC-ES431 and MIL-C-10578.

KLEM PRODUCT of the MONTH

MINIT KOTE

Cleans, neutralizes, phosphatizes in 60 seconds. Frees metal surfaces from all traces of oil and dirt. Deposits light, uniform, phosphate coating for better adhesion of paint to ferrous metals and aluminum. Write for details.

KLEM Chemicals Inc.
14401 LANSON . . . DEARBORN, MICHIGAN



Adjusting the special water cooling valve on a new compound forming rack at the Stevens of Canada Buffing Composition plant in Windsor.

ated with Electric Auto-Lite Co., Studebaker Corp., Aviation Div., and National Pressure Cooker Co.

Ritter in Charge of Stokes' New St. Louis Office

The F. J. Stokes Machine Co., Philadelphia, Pa., has appointed *L. E. Ritter* sales engineer in charge of the company's new St. Louis office.

Mr. Ritter came to Stokes in 1952 from the *A. Y. McDonald Co.*, in Dubuque, Iowa. He attended Washington University in St. Louis, Mo. and Shurtleff College in Alton, Ill.

Formerly, the many Stokes customers in the Central and Southwestern states were serviced from the firm's Chicago office. To broaden and increase this already efficient servicing, the new St. Louis office has been opened. Mr. Ritter will be regularly visiting Kansas, Missouri, Arkansas, Louisiana, New Mexico, Oklahoma, Texas and Illinois. This is home territory for Mr. Ritter, since he has been active in this area for several years.

Frederic B. Stevens of Canada, Ltd., Complete new Plant Facilities

Frederic B. Stevens of Canada, Ltd. have announced the completion of new plant facilities in their Windsor, Ontario buffing composition plant.

The new equipment was specially designed for the company to produce, in quantity, finishing compounds that would be more uniform in quality, texture and dimensions. New mass production forming equipment, designed for ease in materials handling, and special cooling apparatus help achieve the uniform quality, texture and cake size. This new equipment was developed because of the splendid results obtained with similar equipment in Stevens modern composition plant located in Detroit, Mich.

Knapp Mills Reveals Clad Metal Techniques

At a meeting of engineers, designers, and metal fabricators recently *Knapp Mills Inc.*, America's largest producer of lead clad steel and lead clad copper for the chemical process industries, presented a new color motion picture entitled, "*New Weapons Against Corrosion.*"

Alfred P. Knapp, president, in presenting the picture said, "Any steel fabricating plant can quickly acquire the techniques involved in producing lead clad steel. They can also learn to fabricate the clad metal to meet any design that is practical for steel itself. While we are constantly expanding our production of the clad metals, we find that the demand now being created may soon outstrip our ability to produce enough not only for the chemical industries but for the new nuclear industries as well."

About four hundred leading metallurgists and scientific specialists in the chemical and nuclear industries attended the premier of the picture, which was held in the Chanin Auditorium at 122 East 42nd St., N. Y. C.

The picture shows, step by step, how the clad metals are produced and

fabricated into a wide variety of equipment.

Beckman Expands National Sales Force

Beckman Instruments, Inc., has started a three-month training program for 21 new sales engineers to carry the newest Beckman instrumentation techniques to manufacturers, research activities and processing industries throughout the United States.

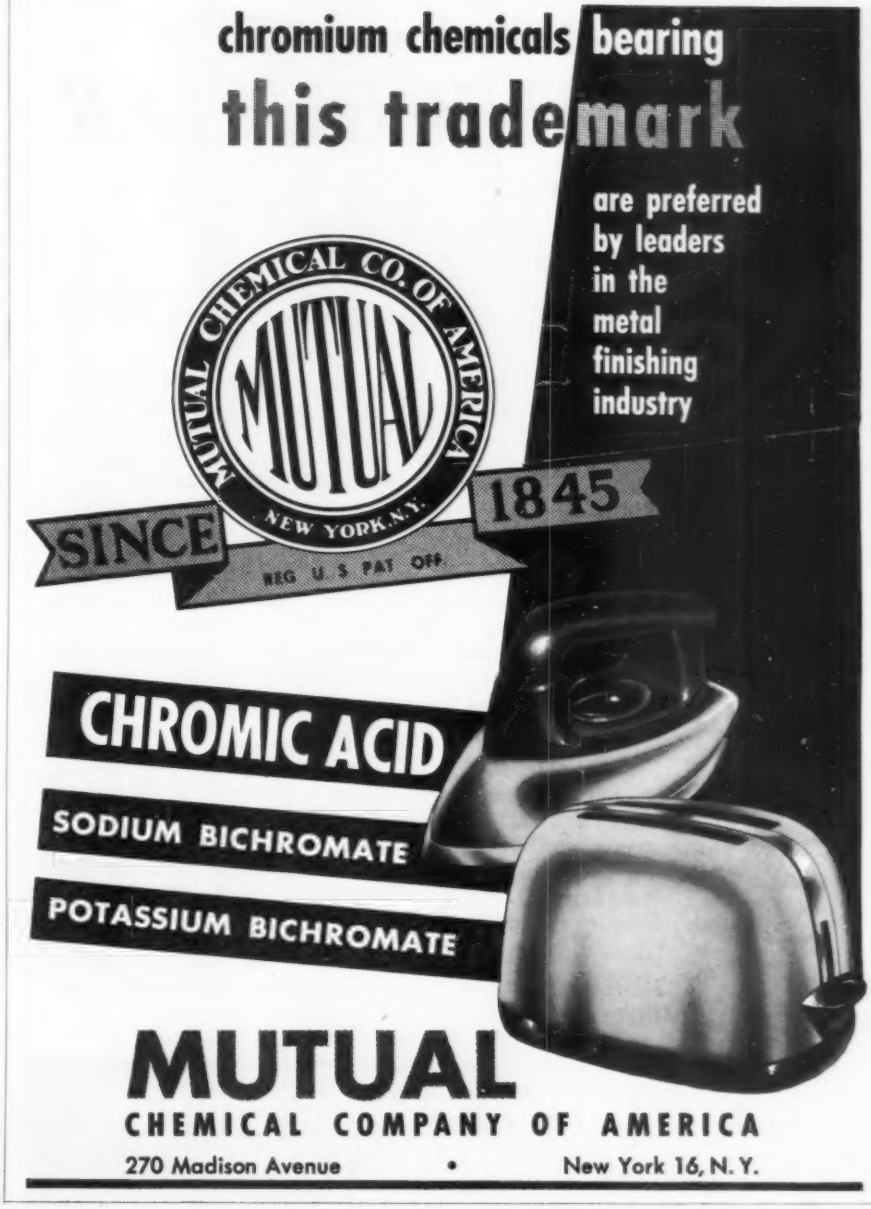
Hand-picked on a basis of scholastic achievement and practical experience, these graduate engineers will receive intensive training in the science of industrial instrumentation, product applications based on actual case histories, public speaking, technical correspondence and salesmanship.

Upon graduation these men will render specialized technical service to the process industries and further assist Beckman marketing organizations throughout the United States and Canada.

Metalwash Machinery Corp. Modernizes Central Office

Metalwash Machinery Corporation recently has expanded and modernized the Main Office Building of its Elizabeth, N. J. plant.

"This addition to our offices completes the first stage of a broad expansion program begun last year," announces *J. L. Pettit*, vice-president and general manager of the 27-year-old firm which manufactures washing, pickling and drying machinery for industry.



Keystone Chromium of Buffalo New Electrofilm Licensee

The Keystone Chromium Corp. of Buffalo, N. Y., has been licensed as a custom processing plant for the Electrofilm Lubelok process in the Buffalo area, it has been announced by *A. R. Booker*, president of *Electrofilm Corp.*, North Hollywood, Calif.

The Keystone Chromium Corp. is a firm of many years standing and have complete facilities for electroplating, rust proofing and metal finishing. The addition of Electrofilm Lube-lok to this company's many services, gives manufacturers in the Buffalo area facilities for the application of the process.

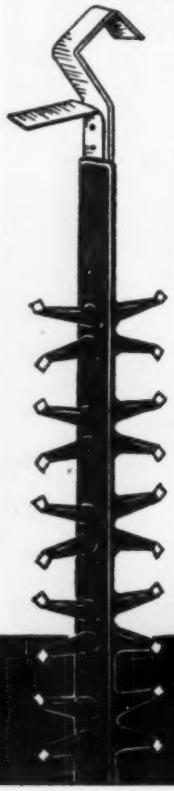
Walker Appointed by Hooker Electrochemical

James S. Walker has been named manager of technical service of *Hooker Electrochemical Co.* according to announcement made by *R. E. Wilkin*, general sales manager of the company. Mr. Walker, a graduate in chemistry from Union College, has been employed by Hooker since 1940. He has served in various capacities as operator, chemist and process foreman. In 1947 he was promoted to the sales department as technical service representative and in 1950 he became technical service supervisor.

NEW AND BETTER INSULATION

The improved BUNATOL Paste is perfectly adapted for use on plating racks and on many other forms of equipment where its use will save time, cost and rejects.

Plating racks insulated for every kind of service; for coating anode baskets; conveyor hooks; material handling equipment; grids; dipping baskets; fans and fan housings; acid pails; buss bar shields; and even for making castings in simple molds without pressure; are some of the everyday uses of the improved BUNATOL Paste No. 1002.



BUNATOL Paste made in Red or Black has all the new improvements in plastisol manufacture plus the famous one-coat BUNATOL Primer which provides that continuous and lasting adhesion which permanently binds the thick Paste coating to the object. Superior performance by any method of comparison. Provides the last word in low cost insulation with less time and labor cost.

No. 1002 heat curing Paste is an extremely tough leather-like material (of any desired thickness) that will withstand all electro plating chemicals such as strong and hot alkalies and acids, and the usual cleaning solutions. Oftentimes the insulation will outlast the plating rack. It's 100% solids so there is no loss from evaporation.

May we send you complete information about BUNATOL Paste? A note on your letterhead is all that is necessary.

NELSON J. QUINN COMPANY
TOLEDO 7, OHIO

Grieve-Hendry Co., Inc. Moves to Larger Quarters

Grieve-Hendry Co., Inc., manufacturers of a standard line and custom-built industrial ovens, has moved to a larger modern factory at 1811-19 W. Lake St., Chicago 12, Ill.

Manufacturing and production have been expanded considerably to take care of increased demand. New facilities provide for expediting quotations and delivery on standard ovens as well as on ovens built to meet particular requirements.

U. S. Rubber Wins Safety Award

The Naugatuck, Conn., plant of the *Naugatuck Chemical Div., United States Rubber Co.* has been awarded the National Safety Council's Award of Honor for three million man-hours without a single disabling injury. The award was presented by *Ned H. Dearborn*, president of the National Safety Council, at a ceremony attended by the plant's 1,500 employees.

Philip E. Rice, factory manager, was presented with a Certificate of Appreciation by *H. E. Humphreys, Jr.*, president and chairman of U. S. Rubber.

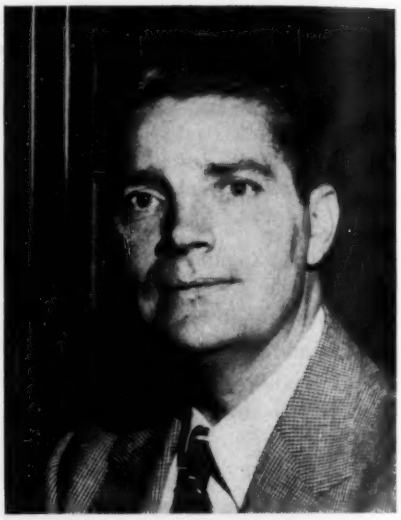
This is the second U. S. Rubber plant to receive the award, and the world's safety record for the industry is held by an affiliate, the St. Jerome plant of *Dominion Rubber Co.*, Canada, with a record of almost 6½ million hours.

Foxboro Announces New Kansas Branch

The Foxboro Co., Foxboro, Mass., manufacturer of industrial instruments for measurement and control, has opened a new branch office at Wichita to serve instrument users in the Kansas area. Located at 2207 South Pinecrest, the new branch brings the Foxboro total to 42 offices within the United States, reflecting the growing demand for instrument engineering in all phases of industrial processing.

Appointed resident engineer at the Wichita Office is *Dale G. Hugley*, who moves to his new assignment after several years of service with the Tulsa Branch as industrial engineer.

American Buff Company Adds Two to Sales Force



Fred Hoffman

The American Buff Company, Chicago, announces two new appointments to its sales staff.

Albert J. Hebsacker has been assigned to cover the Detroit area, and part of Ohio. His headquarters will be in Detroit, under the supervision of *Stanley P. Sax*, vice-president of the company.

Fred Hoffman has taken over part of the Indiana and Kentucky territory with Indianapolis as his headquarters.

The appointment of these two new men will round out the American Buff sales organization and provide greatly improved service for customers in those areas.

Advance Plating of Cleveland Under New Management

E. F. Durkin, who founded the company in 1932 and has headed it since

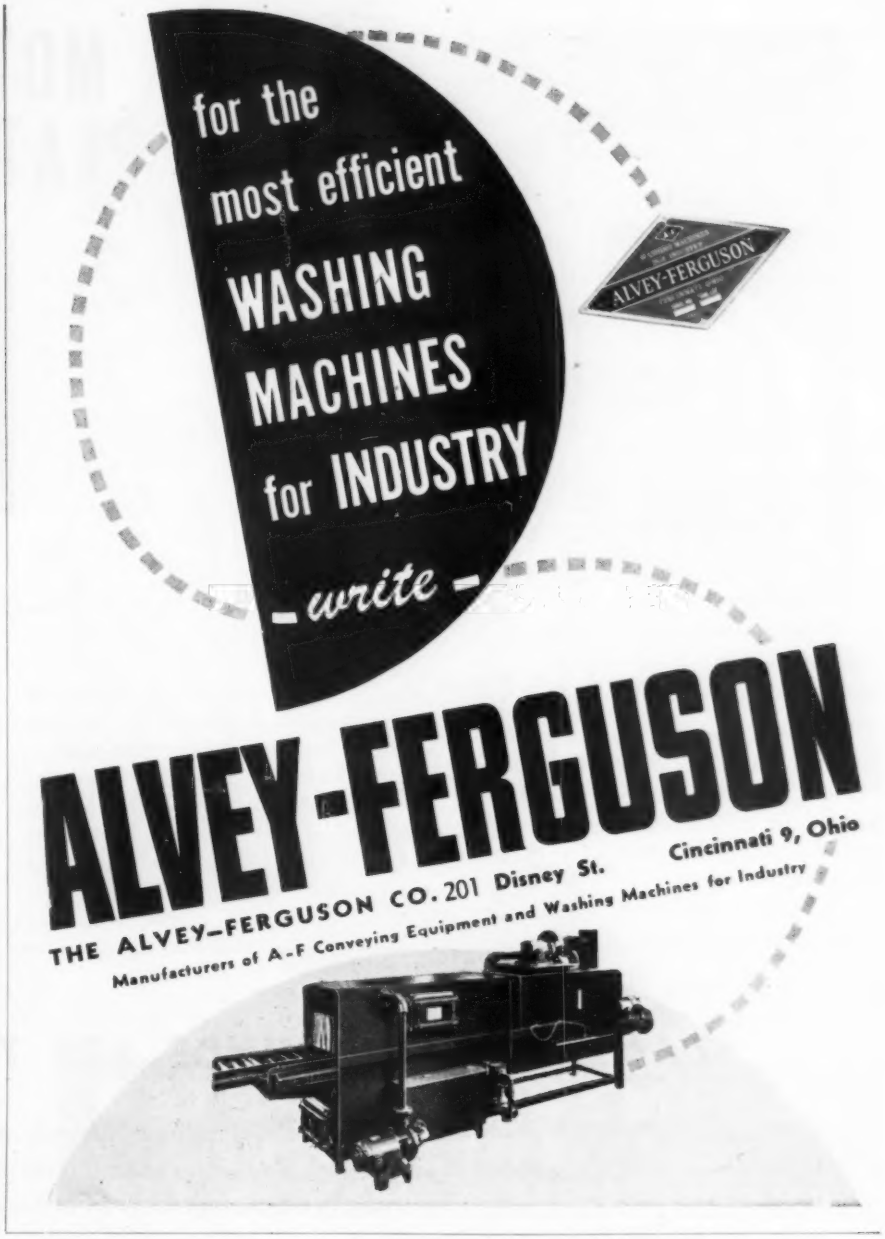
Leonard N. Flicker

that time, retired from the presidency on February 2nd. *Leonard N. Flicker* is now the president of the company and *Arthur H. Losey*, vice-president. Durkin continues as director and consultant.

Mr. Flicker has been vice-president for seven years and is starting his eighteenth year with the company. Mr. Losey for the last three years has been chief process engineer for *Acme Manufacturing Co.*, of Detroit, makers of automatic polishing and buffing equipment. He has also been associated with *Hammond Machinery Builders* of Kalamazoo, *Frederic B. Stevens Co.* of Detroit, and has operated a job plating shop of his own.

The new officers plan to mechanize the plant, to increase capacity and improve quality. The company employs about sixty people and is one of the larger jobbing metal finishing shops in the Cleveland area. It specializes in polishing, buffing, Roto-finishing, painting and electroplating of production items used in the automotive, household appliance and plumbing goods industries.

Arthur H. Losey



Pennsalt Transfers Hampson, Staples

Philip C. Staples has been appointed Chicago district sales manager of the *Industrial Chemicals Department* of the *Pennsylvania Salt Mfg. Co.* He replaces *John C. Hampson*, who returns to the Philadelphia office as a product supervisor in the same department.

Mr. Staples, a graduate of Harvard University, joined Pennsalt in 1937. After finishing the company's student training course, he served in the company's Technical Service Department, Sales Development Department, Metal Processing Department, Industrial Chemicals Department, and most recently he has been Manager of Pennsalt's Washington office. During World War II he had an outstanding record as a Lieutenant Colonel in the Rangers in the United States Army under General Patton in the European Theater.

A graduate of the U. S. Naval Academy, he joined Pennsalt in 1936 as a salesman in the Food Industries Department. He subsequently served in Purchasing Department as an expediter and then returned to sales in Metal Processing and Industrial Chemicals. He was Chicago District Sales Manager for two years before his recent appointment.

MOTOR CITY PLATING NEWS

by

Edward Finne

Simonds Appoints E. F. Mitchell

Simonds Abrasive Co. announces the appointment of *E. F. Mitchell* as Detroit district manager, with headquarters at the branch office and warehouse located at 17155 Conant, Detroit 12, Mich.

Mr. Mitchell entered the employ of the company in 1937 and for the past 16 years has been sales representative in the Michigan territory. He brings to his new assignment in Detroit a long record of successful sales achievement and experience in the mass production metal-working industries.

Emmett of Detrex Awarded Watch

Robert A. Emmett, former president of the *Detrex Corporation*, Detroit, manufacturer of industrial and dry-cleaning equipment and chemicals, is shown (left) admiring a watch given him recently upon completing 30 years

STAMPING COMPOUNDS ARE TOOLS, TOO!

Stamping compounds now are recognized as important tools in the stamping industry. You must choose the right stamping compound to gain full benefit from your equipment.

PILLSBURY CHEMICALS is based on this modern trend. The versatility and advantages of **PILLSBURY** stamping compounds are proved by their wide-spread acceptance and expanding use in industry. Each compound is scientifically formulated and thoroughly tested before it is released. Rigid control throughout the manufacturing process assures unvarying quality from batch to batch.

Stampings made with **PILLSBURY** compounds generally require less finishing and are produced at a high rate, with increased die life.

Experienced technicians will work with you right on the job—to help you produce a better product at lower overall cost. Just write or call

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Preplating Cleaners, Rustproofings and Stamping Compounds

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Walnut 5-4141

of service with the company. *A. O. Thalacker*, right, new Detrex president, gave the award to Emmett, who was elected chairman of the board. In taking over as president, Mr. Thalacker told Detrex employees: "I will tolerate nothing less than a continuation of the highest ideals of business ethics."

Kold-Hold Names Stowell and Saxton

S. J. "Pat" Stowell has been appointed merchandise manager of the *Kold-Hold Manufacturing Co.*, Lansing, Mich. according to an announcement by *J. R. Tepfer*, vice-president and general sales manager. He will be responsible for correlating sales of all of the company's products.

Stowell has only recently returned from fourteen months' duty with the U. S. Navy as Operations Officer aboard a mine sweeper. Previous to this, he was district sales manager for the Lonergan Mfg. Co. and Refrigeration Corp. of America. He has had wide and varied experience in both the refrigeration and heating fields.

S. J. Stowell

Robert W. Saxton has been appointed sales manager of the Contract Division according to an announcement by *J. R. Tepfer*, vice-president and general sales manager. "Bob" Saxton has won recognition in sales work and for the past six years has been district sales supervisor for the U. S. Gypsum Company of Chicago. He is a four-year veteran of the U. S. Navy with service as navigator of a destroyer tender in the Mediterranean Sea operations.

Zook Promoted by Jensen Specialties

F. V. Jensen, president of *Jensen Specialties, Inc.*, 9331 Freeland, Detroit, announces the recent appointment of *Burtron Zook* to the position of sales manager for the Jensen line

Burtron Zook

BETTER COMPOUNDS *mean* MORE PRODUCTION *and* INCREASED PROFITS

Thirty years of experience developing and furnishing Polishing and Buffing Compounds to the Automobile Industry and hundreds of allied metal working firms entitles us to solicit the opportunity of working on your polishing and buffing problems.

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C. H. McAleer, President.

DETROIT CHEMICAL SPECIALTIES, Inc.
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Tanks and fume systems of corrosion-resistant Haveg offer a permanent answer to your need for long-life, maintenance-free pickling equipment. This unique plastic is molded into large and small tanks, fume ducts and hoods, parts for circulating picklers. Since it is not a lining or coating, and possesses uniform resistance to corrosion, Haveg belongs in your system.

Learn all the facts about Haveg! *Write today for 64-page Bulletin F-6.*

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Factory capacity has been increased. Deliveries are getting much better!

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CHICAGO 11 — 1201 Palmolive Bldg. — Delaware 7-6266
DETROIT 35 — 19951 James Couzens Hghwy. — Broadway 3-0880
CHATTANOOGA 2 — 825 Chestnut St. — Tel. 7-7478
HARTFORD 5 — 86 Farmington Ave. — Hartford 6-4250
HOUSTON 4 — 4101 San Jacinto — Jackson 6840
LOS ANGELES 14 — 523 W. Sixth St. — Mutual 1105
SEATTLE 7 — 5600 14th Ave. N.W. — Hemlock 1351

of industrial ovens and heating equipment.

Zook has served with the company as a sales engineer for the last seven years. He has 17 years' experience in industrial sales engineering, the last 13 of which have been in the infrared heating field.

Paul H. Goodell, sales manager for three years, will be retained in a consulting capacity on engineering and development problems connected with Pan-L-Heat Radiant Rod Ovens.

Haas Miller Corp. Appoints Representatives

The *Haas Miller Corp.*, Philadelphia, Pa., manufacturers of industrial chemicals, oils and greases have announced the appointment of two new representatives. *Richard Chesrown* of Toledo, Ohio, for the state of Ohio, and *Frederic Pushaw* of Grosse Ile, Mich., former president of the *Michigan Colloids Co.*, for the state of Michigan.

New Michigan Abrasive Mgr.

Morgan W. Burt has been appointed as a divisional sales manager for the *Michigan Abrasive Co.* announces *Max C. Jones*, president.

Burt has been connected with the abrasive industry since 1921 when he joined the *Manning Abrasive Co.*

Oakite Award

R. J. Crane, technical service representative for *Oakite Products, Inc.* in the Detroit area received the company's Distinguished Service Award from *John A. Carter*, president. Five awards are made annually to members of the field organization who have rendered especially notable service to industry.

Associations and Societies

AMERICAN ELECTROPLATERS' SOCIETY

Louisville Branch

The regular monthly meeting of the Louisville Branch, American Electroplaters' Society was held Thursday, December 18, 1952 at Korfhages Restaurant 1482 Preston Street, Louisville, with a dinner served at 7:00 P.M. President *Arthur A. Oertel* opened the business and open meeting at 8:00 P.M. with 24 members and guests present.

The roll call of officers was read and 1st Vice-President, *P. H. Pate*; 2nd Vice-President, *John W. Scholl*; Sergeant-at-Arms, *Paul DeHaven*; and Board of Managers, *T. K. Allison, Al Sterdle* and *G. A. Logsdon* were reported absent. The minutes of the previous meeting were read and accepted.

C. R. Arbegust, Chairman of the Roster Committee, reported that the temporary roster report will be available at the January meeting. It was also reported that a permanent roster notice which will include the speakers for the coming year will be given consideration at some future date. The Membership Committee reported seven applications and balloting for membership. The Technical Sessions Committee reported that *J. V. Davis* of the Udylite Corporation, Detroit, Michigan, will be the January speaker and the subject will be "Savings by Use of a Full Automatic Machine" accompanied by a film.

Applications and balloting for membership were on *Linford L. Jones, Raymond J. Nardelli, John S. Houston, Mario Clementi, P. James Grote, Harry L. Wuebbold* and *Alfred O. Hook*.

A letter was received from *Frank C. Mesle* of the Syracuse Branch asking the Louisville Branch to support *Daniel Gray* for the Third Vice-Presi-

dent of the Society at the National Convention to be held in June 1953 at Philadelphia, Pennsylvania. The letter was ordered to be placed on file.

A letter from Franklyn J. McStoker, President of the Society, asked the Louisville Branch to send their delegate or delegates to the Interim Meeting. Due to the expenses involved the Louisville Branch at this time decided not to send any delegates. The letter was ordered to be placed in file.

Henry D. Bowen was transferred here from the Philadelphia Branch. We welcome Mr. Bowen to our Branch.

Through the courtesy of *Harvie Johnson* of the *Belke Manufacturing Co.*, a full length film of real action scenes were shown. The pictures proved very interesting and refreshments were then served, courtesy of the company.

Cincinnati Branch

The Cincinnati Branch of the A.E.S. started off the New Year with a good turnout at its meeting on January 28, 1953 at The Engineering Society Headquarters, festivities starting with the usual excellent supper. Prexy *Bob Miller* opened the proceedings with an announcement about the Engineering Society's Annual Joint Meeting to be held on February 27th. Although volunteers are sometimes difficult to obtain, *Carl Truman* and *Stanley Garfinkel* readily agreed to represent the Branch at this function. The President next read an invitation from the Ohio-Sesqui-Centenial Committee to participate in their celebration this year. No action was taken.

In connection with his letter of September 8, 1952, suggesting a change in the time of the annual convention, *Charles Wise* presented the following Amendment as drawn by *Manson Glover*, Chairman of the A.E.S. Legal Committee:

WHEREAS: The Constitution of the Society now designates for the Annual Convention the four warmest months of the year; and

WHEREAS: These months are in certain cities, otherwise eligible and well equipped for the entertainment of the Convention so extreme in heat that for humanitarian reasons they are barred from consideration; be it therefore

RESOLVED: That, to relieve the entailed hardship and to make possible when it may seem desirable the holding of the Convention in these cities, the Constitution of the Society, Part I, Article VI, Section 1 be amended as follows:

Strike out the second sentence and substitute: "The Annual Meeting and Convention shall be held on dates agreed upon by the Executive Board and the Branch designated to entertain the Convention, hereinafter called the Host Branch."

Without a dissenting vote, the Amendment was thereby passed, and will be referred to the Executive Board. If it obtains their approval, it will be placed on the agenda for action at the Philadelphia convention in June.

A progress report on the Educational Session and Dinner Dance was made by Charles Wise with the plea that all buy and sell as many tickets for the Dinner as possible.

Mr. Miller introduced *Howard J. MacAleer* of *Formax Mfg. Co.*, Detroit, whose subject was "Polish Up On Your Buffing Data." Mr. MacAleer discussed in detail the various abrasives and types of greases used in the manufacture of buffing compounds, and then gave an explanation of methods and procedures used in the making of full disc, pieced and bias buffs. His company also served as hosts for the Social Hour and bull session which concluded the meeting.

Charles Wise,
Secretary

Baltimore-Washington Branch

On Saturday, January 17, 1953, the *Baltimore-Washington Branch* held its annual Educational Session coupled

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DEPENDABLY UNIFORM

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FRIENDLY, PERSONAL SERVICE

You can get a quick, unequivocal "Yes" or "No" on your Chromic Acid requirements from interested owner-principals who value your business.

We have yet to have a legitimate complaint on the quality of B.F.C. Chromic Acid. Its chemical analysis is as fine as its physical appearance!

One Price. One Standard of Quality and Service to all—whether the market is short or long. Distributor Stocks in many Principal Cities.

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122 East 7th St., Los Angeles 14, Calif.

with a dinner and dance. The festivities took place at the Hotel Statler, Washington, D. C.

During the afternoon session three technical talks were presented. They were:

"*Plating on Aluminum*" by *Henry Paige* of the Aeronautical Materials Laboratory, Naval Air Experimental Station, Philadelphia.

"*Electrodeposition from Non-aqueous Solutions*" by *Dr. Gwendolyn B. Wood* of the National Bureau of Standards, Washington, D. C.

"*Plating Problems for the Future*" by *Walter L. Pinner*, Houdaille-Hershey Corp., Detroit.

In the evening the banquet was held in the South American Room of the Statler. The attendance was in excess of 100. *Dr. William Blum* served as toastmaster. President *MacStoker* was inducted into the "Order of the Pot" by past president *Ken Huston*. President MacStoker followed with some choice comments on the subject of the then impending inauguration of President Eisenhower.

The evening was topped off by dancing to a fine orchestra; those who didn't dance, and some who did, spent a good deal of time gabbing about the old days and why they were gone forever.

New York Branch A.E.S. Holds Annual Banquet

A very successful open meeting and banquet, sponsored by the *New York Branch* of the *American Electroplaters' Society*, was held at the Hotel Statler on Saturday, February 14.

Angelo Amatore
President

George Schore
Secretary-Treasurer

Peter Veit, librarian of the branch and now associated with the Farrand Optical Co., presided over the afternoon educational session. Papers were presented by *Mr. Peter Stevens*, chemist for Kenmore Metal Products Corp., 380 Ninth Street, Jersey City 2, N. J., who spoke on the "Economic Advantages of Preplated Wire"; *Mr. C. F. Nixon* of General Motors Research Dept. and former president of

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the Southwest's leading supplier of industrial plating and polishing
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high speed TIN anodes

M & T's new High Speed Tin Anodes, for use with either sodium stannate or potassium stannate baths, offer several advantages over pure tin anodes.

1. They can be operated at nearly double the usual current densities without becoming passive.
2. They film at little or no excess current density.
3. The operating film is darker; more easily recognizable.

M & T Anodes, both in Pure Tin and of the High Speed type, are available in slab form with cast-in steel hook.

For additional data, write for the bulletin "Alkaline Tin Plating."

METAL & THERMIT CORPORATION
100 EAST 42nd STREET, NEW YORK 17, N. Y.
Specialists in Tin and Tin Chemicals

the A.E.S., whose subject was "What is Quality," and *Dr. Louis Weisberg*, chemical engineer, 71 West 45th St., New York 36, N. Y., whose subject was "What of Tomorrow."

The banquet, held in the Grand Ballroom, was well attended and featured an excellent floor show by top entertainers currently appearing on television and Broadway.

Albert Fusco
General Committee Chairman

Peter Veit
Presiding Officer

January Meeting

The meeting was called to order by *A. Fusco*, 1st vice-president, on Friday, January 9, 1953, at the Hotel Statler, New York. The minutes of the previous meeting were read, and approved. The Roll of Officers was called and the following were noted absent: *A. Amator, M. Nadel, G. Schore, J. Sterling.*

There being no other business, the meeting was turned over to *P. Veit*, who in turn presented a three reel sound and color film "Corrosion in Action," by the *International Nickel Co.*, which was most interesting.

Pittsburgh Branch

The Pittsburgh Branch of the American Electroplaters' Society held its monthly meeting January 8, at the Sheraton Hotel. Twenty members and guests enjoyed a delicious dinner prior to the business meeting at which there were approximately forty members.

Four new members were welcomed into the Branch. They are: *Franklin Cutshaw*, Aero Supply Co.; *Harry A. Early*, Pittsburgh Commercial Heat Treating; *Henry J. Schaltenbrand*, Pittsburgh Commercial Heat Treating; *Harold L. Franks*, Oakite Products.

The speaker for the evening was *Walter L. Pinner*, of Houdaille Hershey Corp., and the subject he spoke on was "Possibilities for the Future." Walter enumerated some of the problems confronting the plating industry and indicated that these would be problems for research in the future. A few of these problems were: (a) What method could be used as an accelerated corrosion test other than salt spray? (b) What improvements

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stainless steel springs blackened to government specifications in addition to all other ferrous metals

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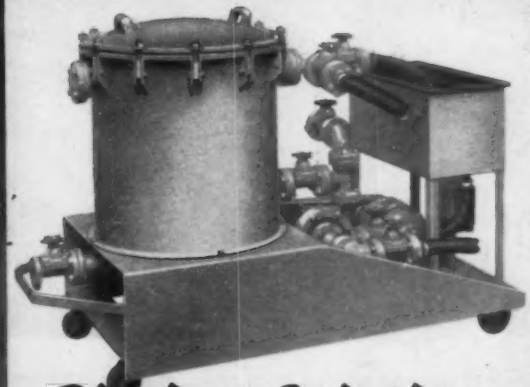

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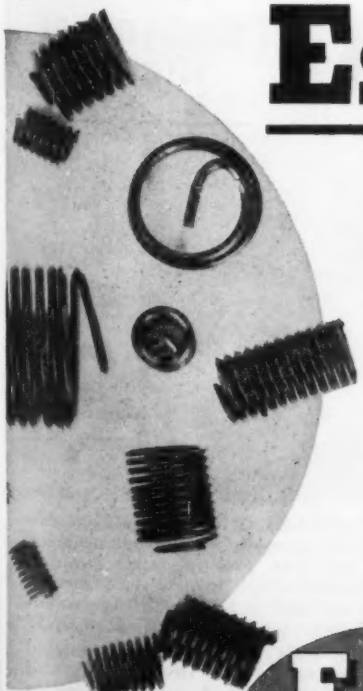

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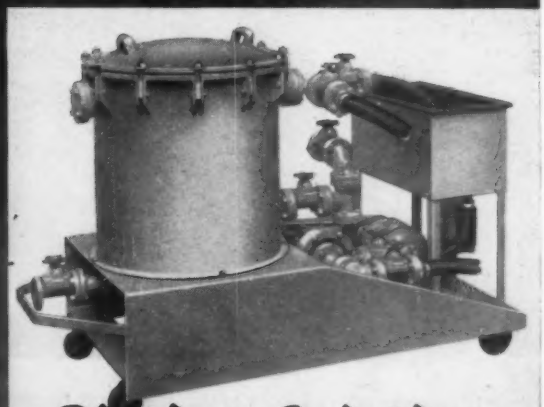

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can be made in polishing prior to plating? (c) What imporvements can be made in buffing copper? He also showed a number of slides pertaining to polishing of steel and also showing the imperfections in the plated surface as a result of improper polishing of the base metal.

An interesting question period followed the presentation and the result was an enlightening and educational technical session.

Twin City Branch

The January meeting of the *Twin City Branch* of the *American Electroplaters' Society* was held on Monday, January 5th, 1953 at 7:00 P.M. at the Pine Tavern Cafe in Minneapolis with 30 persons present.

Following dinner, Branch President *Jerome M. Weller* of Minneapolis Honeywell Regulator Company called the meeting to order and introduced *George Belair* of Merchants Chemical Co. who was a guest. *Raefel Diaz* of Minneapolis Honeywell Regulator Co. was introduced to the Branch as a new member and he was welcomed into our membership. It was announced that *C. Barth* of Merchants Chemical Co. had recently transferred from the Cincinnati Branch to the Twin City Branch and he was also welcomed.

Albert Joyner of the Silver Shop was greeted by those present at the January meeting inasmuch as Mr. Joyner has been away from the meetings and his business for some time due to an illness. It was announced that the future meetings would be held at the Covered Wagon Cafe in Minneapolis for the months of February through June inclusive.

Following the business meeting, Branch Librarian *Fred Kaim* of Superior Plating turned the meeting over to *Joseph Irwin* of the *Promat Division* of *Poor and Co.* who spoke on white brass plating, a subject which was of considerable interest to all in attendance and a talk which was very well presented. There were several questions presented to Mr. Irwin and the meeting was enjoyed by all present.

Boston Branch

The Boston Branch of the A.E.S. will hold its 17th Annual Technical Session & Banquet April 18, 1953 at Hotel Statler, Boston. Technical Session will be as follows:

Clifford Struyk, Technical Service Engineer, General Chemical Div. Allied Chem. & Dye Corp., 40 Rector St., New York 6 N. Y. "*Plating from Fluoborate Solutions.*"

Dr. Walter R. Meyer, President & Research Director, Enthone, Inc., 442 Elm St., New Haven, Conn. "*Adhesion of Electrodeposits & New Methods of Cleaning and Oxide Removal.*"

H. C. Irvin, President, Allied Research Products, Inc., 4514 E. Monument St., Baltimore, Md. "*Chromate Coatings.*"

Educational Session — Bay State Room at 1:30 P.M.

Banquet—Grand Ballroom at 7:00 P.M. No speeches, Door Prizes with the Dessert, Floor Show and Dancing.

Melbourne Branch

The *Melbourne Branch* of the *American Electroplaters' Society* will hold a 1953 Australian Federal Convention at the Hotel Federal, Melbourne, May 18th to May 20th.

Dr. W. Blum, formerly Head, Electrodeposition Section, National Bureau of Standards, Washington, D. C., will give the Convention address. His topic will be, "*Latest Trends in Electroplating Practice.*"

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in 3 minutes
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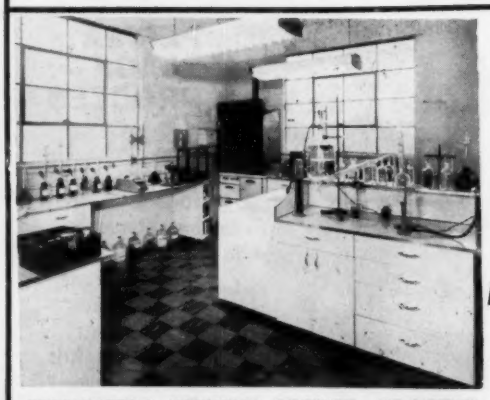

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SMOOTHEX BRIGHT NICKEL PROCESS results INSTANTLY in an over-all smoother and unsurpassed nickel-brilliant finish on your plating jobs! No dull period! Flaws, lines, irregularities vanish . . . easy-to-control SMOOTHEX is unexcelled in line filling properties! Top quality plating jobs at LOWER COST! SMOOTHEX NICKEL BRIGHTENERS are formulated under careful laboratory control and their quality and uniformity are guaranteed. Our broad experience offers you a prompt, sure solution for your plating problems. Write for additional information . . . or send us a sample of your solution for conversion instructions. *Conversion* to SMOOTHEX is LOW COST.

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The Technical Sessions will be as follows:

FIRST SESSION — MONDAY, MAY 18th

"Plant Engineering"

C. J. Cocks, Works Chemist, Jason Industries Ltd., Welshpool, W. A.

"Current Supply and Electrical Hazards"

J. Della-Pietra, Manager, Tele-Communications Dept., Standard Telephones and Cables Ltd., Vic.

"Abrasive Belt Polishing"

A. E. Fowler, Director, Behr-Manning (Aust.) Pty. Ltd., Lidcombe, N.S.W.

SECOND SESSION — TUESDAY, MAY 19th A.M.

"Bath Purification with Activated Carbon"

W. J. Blanch, John Blanch Pty. Ltd., Finsbury, S. A.

"New Methods for Plating Control"

R. D. Taylor, Chief Chemist, Electrolux Pty. Ltd., Melbourne.

"Control of Bright Nickel Solutions"

H. Robins, Chief Chemist, Lawrence Smith & Co. Pty. Ltd., Sydney.

"Values and Limitations of Plating Analysis"

B. Johnston, Scientific Equipment Manufacturer, Melbourne.

THIRD SESSION — TUESDAY, MAY 19th P.M.

"Electroplating and A.E.S. Research"

Dr. W. Blum, U. S. A.

"Some Experiences in Alloy Plating"

B. W. Armstrong, Lecturer-in-Charge, Electroplating, School of Chemical Engineering, N.S.W. University of Technology.

"Engineering Uses of Electroplating in the Aircraft Industry"

D. W. Glanvill, Foreman, Electroplating and Heat Treatment, Trans-Australia-Airlines, Essendon, Vic.

Further information may be obtained by writing to *Mr. S. B. Pearce*, Honorary Secretary, American Electroplaters' Society, Melbourne (Australia) Branch, G.P.O. Box 4591, Melbourne.

Rockford Branch

The *Rockford Branch* of the *American Electroplaters' Society* will hold their Eleventh Annual Educational Session and Banquet at the Faust Hotel, Rockford, Illinois, on Saturday, April 18th, 1953.

Los Angeles Branch

Stuart Krentel, librarian of Los Angeles Branch of the *American Electro-Platers' Society*, topped a year of unsurpassed achievement in providing the branch with outstanding speaking talent when, on the night of February 11th, with pardonable pride, he presented the man who is unquestionably tops in the field of electroplating, *Dr. William Blum*, recently retired Chief of the Electrodeposition Division and Assistant Chief of the Chemistry Section, *National Bureau of Standards*.

Announcement of the appearance of the beloved Dr. Blum at a local meeting for the first time since he addressed Los Angeles' annual educational session in the spring of 1940, attracted the largest attendance in several years.

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Metal Cleaners for all purposes.

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NO ROUGH DEPOSITS
NO PITTING

Model LSI-10
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H.T. Lucite Filter Assembly
Portable, Wt. 40 lb.
12"x16"x16"

SETHCO FILTER PUMP LSI-10

- Filter solutions from ph 0 to ph 14.
- No loss of precious solutions.
- Stainless Steel (316) or Hastolloy Pump and Fittings.
- H. T. Lucite, Stainless (316), Rubber-lined, Haveg or Sethrin* Resin Filter Assemblies.
- Cotton, Dynel, Orlon, Nylon, Spun Glass, Porous Stone or Porous Carbon Filter Tubes.

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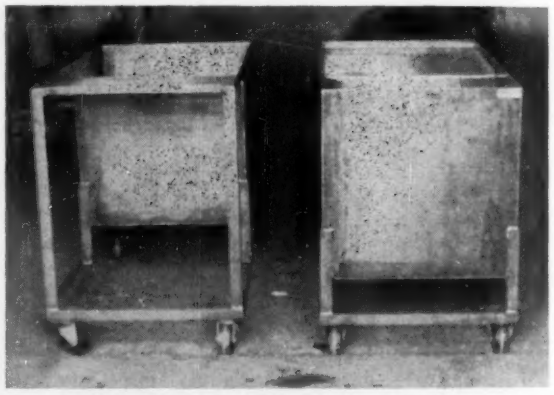

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Manufacturers of Welded Fabrications to Specification

convention deliberations of three prominent industry groups within a matter of one week in March. Wooley pointed out that sessions of the *American Chemical Society* and of the *American Society for Metals* will be held in March preceding and following the branch's annual educational session at the Statler Hotel on March 21. Various of the technical societies who are co-sponsors of the Western Metals Congress and Exposition March 23 to 27th have one-day technical meetings scheduled in Los Angeles, Wooley reported, each of which affords members of the A.E.S. a rare opportunity to share in the deliberations.

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The program, Hess reported, has been divided into morning and afternoon technical sessions, with an interlude for a non-technical, non-speech-making luncheon at noon. A story telling contest, popular in past years, will feature the luncheon, with suitable prizes to be awarded to the best raconteur, to be determined by volume of applause. The evening entertainment will start with dinner at 7 o'clock, with dancing to follow. An attractive variety of door prizes, mainly in the form of quality plated items donated by shop owners and manufacturers, have been assembled for distribution during the dance, Hetz reported. On the program also is a waltz contest, which annually has attracted a dozen or so couples to compete for a pair of attractive trophies.

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Indianapolis Branch

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If obtaining Nickel Salts is your problem, then you'll be interested in our Nickel Sulphate, Nickel Chloride and other finest quality Nickel Salts. Whether you buy a single barrel or several tons, our guarantee of *absolute satisfaction* is your assurance of quality products meeting the most rigorous requirements of any plating department.

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Copper Cyanide
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Nickel Carbonate

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Hefty Hanna here has weight worries. Maybe fat and flabby pickling equipment is out-weighing production efficiency in your plant. Remember Monel®. Monel is lean and strong. Thinner sections of Monel mean light-weight fixtures and heavier pickling loads for you.

Consult your Distributor of Inco Nickel Alloys for the latest information on availabilities from warehouse and mill. Remember, too — it always helps to anticipate your requirements well in advance.

And, today, write for "A Good Start To A Better Finish." Free, of course.

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67 Wall Street, New York 5, N. Y.

Monel PICKLING EQUIPMENT — extra life, extra capacity, extra safety

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- No loss of precious solutions.
- Stainless Steel (316) or Hastolloy Pump and Fittings.
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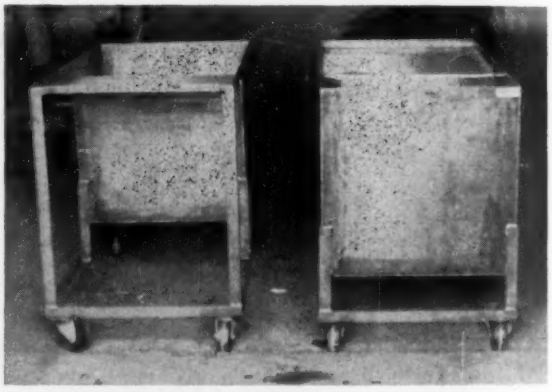

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Special equipment for taking care of product parts which tend to pile up and get in the way need not be complicated or expensive. You don't "shop around" for such equipment; you design it. Storts engineers can help you with design and Storts weldmen will build the equipment to last.

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Hefty Hanna here has weight worries. Maybe fat and flabby pickling equipment is out-weighing production efficiency in your plant. Remember Monel®. Monel is lean and strong. Thinner sections of Monel mean light-weight fixtures and heavier pickling loads for you.

Consult your Distributor of Inco Nickel Alloys for the latest information on availabilities from warehouse and mill. Remember, too — it always helps to anticipate your requirements well in advance.

And, today, write for "A Good Start To A Better Finish." Free, of course.

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Monel PICKLING EQUIPMENT — extra life, extra capacity, extra safety

thing is progressing well. This included the publicity, tickets, program, sustaining contributions, favors and arrangements. *Dr. A. M. Max*, delegate to Columbus, Ohio Interim Meeting reported fifty delegates attended the meeting with the East well represented. Much discussion took place about the type of articles printed in "Plating." The need of more practical articles printed was stressed and to extend to organic finishes besides metal finishing.

One new member was voted in by a motion made by *Les Reynolds* and seconded by *Bert Hawhee*. He was *Joseph A. Downey*, plating superintendent of Zenite Metal Corp. The program was given by one of our own members, *Leon Deere* of Naval Ordnance who talked on "Special Finishes." Some of these special finishes given were aluminum anodizing, hard chromium on aluminum, black on steel, rhodium on silver plated parts. The process of metalization of plastics for electrical conductivity was presented. These prove to be light in weight, heat and moisture resistant. Seven to fifteen thousandths copper, iron, nickel or a combination of deposits can be plated on plastics. Mr. Deere had several samples of this plating on plastics to show the group. After his talk, questions were asked by the group. Free refreshments were served. The meeting adjourned at 9:00 P.M. At the following of this meeting, the Educational Session and Dinner Dance Committee met.

Cincinnati Branch

The Cincinnati Branch will hold its Annual Education Session and Dinner Dance of the Cincinnati Branch, A.E.S. on March 28.

Tickets for the Dinner Dance, at $7.50 per person, may be obtained from *Chas. T. Nuzum*, 3284 Vittmer Ave., Cincinnati 38, Ohio.

Hotel reservations may be made through *Will Loveless* (KIrby 7610, day, or KIrby 0254, night). Mr. Loveless will also arrange for dinner reservations for parties of 10 persons or more. Reservations will be limited to 350 persons, so you are urged to get yours in early.

PROGRAM

2:00 P.M. — Educational Session; Clyde Kelly, A.E.S. 3rd Vice-President, Session Chairman.

1. "Impressions of the Japanese Finishing Industry," Ezra A. Blount, Editor, Products Finishing Magazine, Cincinnati, O.
2. "Principles of Effective Job Shop Management," Carl F. Hansen, owner, Advance Tinning Company, Chicago, Illinois.
3. Symposium on Waste Treatment. "Why We Must Treat Our Waste," Hudson Biery, "Ohio Commissioner" to the Ohio River Valley Water Sanitation Commission, Cincinnati, Ohio.
   "Methods for Treating Metal Finishing Wastes," H. S. Kline, Industrial Hygiene Engineer, Frigidaire Div., G.M.C., Dayton, Ohio.

Members of the Waste Treatment Panel, in addition to Mr. Kline and Mr. Biery, are:

J. E. Kinney, Sanitary Engineer, Ohio River Valley Water Sanitation Commission, Cincinnati, O.
A. M. Reed, Chemist, Electric Auto-Lite Company, Lockland, O.

7:00 P.M. — Entertainment, Dinner Dance. (Favors for the ladies.)

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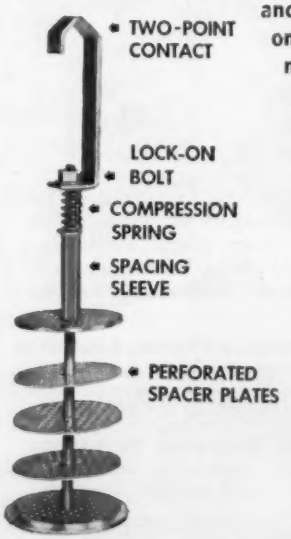

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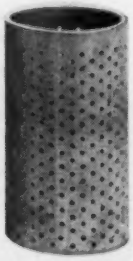

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***Barrel Nickel Plating with* TRUE BRITE NICKEL BRIGHTENER**

Increase Production

easy to control . . . cuts down on trouble that entails costly delays.

Save time

can be operated at a higher speed.

Reduce Rejects

gives unbelievable uniformity of deposit in recesses . . . brighter, white color.

Write for **FREE** *bulletin revealing tricks on improving your nickel plating and cutting costs.*

TRUE BRITE CHEMICAL PRODUCTS CO.
P. O. Box 31, Oakville, Conn.

MASTERS' ELECTRO-PLATING ASSOCIATION

On January 14, 1953 the new executive committee of the *Masters' Electro-Plating Association, Inc.* of N. Y. C. held its first of their meetings for the 1953 term. The executive committee comprises the following: *Irving Berkman* of Berkman Brothers, *Joseph F. Brust* of Brust Brothers, Inc., *Alfred D'Agostino* of Albert Plating Works, Inc., *John Forbath* of Star Chromium Corp., *Jesse Goldman* of Grand Chromium Plating Co., *Frank Kaiser* of Long Island Mechanical Plating Co., Inc., the retiring chairman, *Samuel P. Levy* of R. Plumacher & Sons, Inc., *Julian Nelkin* of Henry Nelkin, Inc., *Sal Novelli* of Service Plating Co., *Philip Ranno* of Imperial Plating Co., and *Philip Sievering* of Philip Sievering, Inc. Ranno was unanimously elected chairman by the committee, and Berkman as treasurer.

Philip Ranno, chairman of the Masters' Electro-Plating Association is also serving a term as president of the *National Federation of Metal Finishers*. Phil has been in the plating business for 23 years.

Philip Ranno

In 1930 when he was sixteen he joined the company founded by his father, *Barney Ranno*, in 1910. While working under the senior Ranno, Phil finished his education evenings and later attended C.C.N.Y. and Columbia University. He also studied electroplating under *Drs. L. C. Pan* and *C. B. F. Young*.

When Phil joined the Imperial Plating Co. the industry was on the verge of a transformation. Steel and die cast zinc were about to emerge as the two metals best suited for mass production. The senior Ranno with Phil and his brother Mario who were production minded, recognized the possibilities and made one of the earliest installations of bright nickel solutions in the East.

In the early thirties the company removed to Furman St., Brooklyn into what was then a modern production shop. There they specialized in long run jobs and showed that a well run job shop could compete with any captive shop of comparable size.

In 1945 the company moved into its own building at 100 Metropolitan Avenue, Brooklyn, where 40,000 square feet is devoted exclusively to plating and polishing. The plant is modern in every respect and includes both automatic plating and polishing equipment. From a volume of $600 per month when the enterprise was started by Barney Ranno; he with Phil and Mario now are partners in a $1,000,000 per year business.

35th Annual Banquet

The association will hold its 35th

SAVE COSTLY OPERATIONS

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ENGLISH WALRUS

AT LOWER PRICES

Polishing and Buffing All Metals

Available in full Sides, half Sides, Pieces, Strips, Bobs and Wheels

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SCO English Buffalo
SCO English Polishing OX Bends

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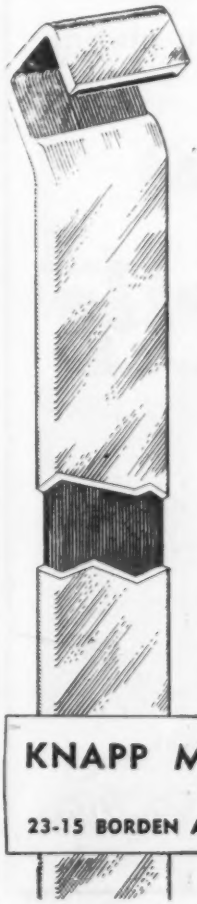

Electro-Cupralum Anodes

FOR CHROME PLATING

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Annual Banquet at the Belmont Plaza Hotel in New York City on Saturday, April 11, 1953. It is expected to be the finest event of its kind and attendance will be by invitation only. Cocktails will be served from 6 to 8 P.M. after which there will be a sumptuous banquet. A Banquet Journal will be published in connection with the event.

NATIONAL ASSOCIATION OF CORROSION ENGINEERS

Robert M. Burns to Receive N.A.C.E. Whitney Award

Robert M. Burns, designated to receive the 1953 *Willis Rodney Whitney Award* of the *National Association of Corrosion Engineers* for achievement in corrosion science, has been honored frequently by election to offices and other posts of responsibility in the professional and technical organizations to which he belongs. Mr. Burns, chemical coordinator and director of chemical and metallurgical research for Bell Telephone Laboratories at Murray Hill, N. J. joined the Laboratories upon their organization in 1925.

Currently chairman of the publication committee of *The Electrochemical Society* and editor of that society's journal, he has been treasurer, secretary and president of the society. Last year he was awarded the 1952 Perkin Medal, considered to be the highest award for achievement in American industrial chemistry.

He has published numerous articles in the corrosion field and is senior author of the book "Protective Coatings for Metals. He has been engaged for many years in administrative work.

A graduate of the University of Colorado, and later recipient of the honorary degree of Doctor of Science from that institution, his graduate work at Princeton led to a Ph.D. in 1921. He was elected to membership in the Colorado University chapters of Phi Beta Kappa, Sigma Xi and Tau Beta Pi. His social fraternity is Delta Tau Delta and he has been national president of Alpha Chi Sigma, the professional chemical fraternity. He has long been a member of the American Chemical Society and has been chairman of its New York Section.

In World War I he served in the Chemical Warfare Service, and after a year of research with Barrett Company, became a member of the technical staff of Western Electric Company before joining Bell Laboratories.

His avocations include book collecting, gardening, walking, skiing and mountain climbing. He has been president of the New York Section of the Green Mountain Club and chairman of the New York Chapter of the Appalachian Mountain Club. He lives with his wife and daughter at Summit, N. J.

THE ELECTROCHEMICAL SOCIETY

Metropolitan Section

The Metropolitan Section held its first meeting of the new year on January 21st with *Dr. Abner Brenner* of the National Bureau of Standards as its featured speaker. Dr. Brenner addressed an unusually large crowd on the subject of the "Electrodeposition of Some of the Less Common Metals from Non-aqueous Solutions." Dr. Brenner stated his belief that all the metals which can be plated from aqueous solutions have been plated and that there is very little hope for an-

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other development like that of chromium plating. The real improvements in the future will come in the non-aqueous field. Metals not now plateable from aqueous solutions include two types: the so-called light metals typified by beryllium, aluminum and magnesium and the so-called refractory metals including titanium, zirconium, molybdenum, tungsten, columbium and tantalum. After outlining possible uses for these now unplateable metals, Dr. Brenner went on to discuss why they are not depositable from aqueous solutions. The reasons in general fall into two classes: Their potentials are too high and therefore cannot be reached in solutions containing ionizable hydrogen or, as in the case of the refractory metals, no simple ions exist and there are, therefore, no simple equilibria at the cathode surface. In the main body of his talk, Dr. Brenner discussed the two principal types of non-aqueous baths, namely fused salt baths and organic solvents. These two types shade off into each other, as in the case where low melting organic salts are used which could be classified as either fused salts or organic solvents. The speaker discussed in particular the plating of molybdenum from fused salts and the plating of aluminum from organic solvents. The meeting was followed by an unusually lively discussion in which many in the audience took part.

F. A. Lowenheim,
Secretary

ASSOCIATION of CONSULTING CHEMISTS and CHEMICAL ENGINEERS, INC.

Open meetings of the Association of Consulting Chemist and Chemical Engineers, Inc., for 1953 are scheduled as follows:

APRIL 21, 1953, Hotel Belmont Plaza, New York City—Symposium and dinner.

OCTOBER 27, 1953, Hotel Belmont Plaza, New York City,—25th Anniversary — Annual Meeting — Celebration, Entertainment and dinner.

Appointments for 1953 are *Robert T. Baldwin*, Exec. Secretary and Asst. Treasurer, and *A. B. Bowers*, Director of Publicity and Asst. Exec. Sec'y.

AMERICAN SOCIETY FOR METALS

Eighth Western Metal Exposition, Pan-Pacific Auditorium, and Western Metal Congress, Statler Hotel, Los Angeles, March 23-27, sponsored by American Society for Metals and other technical groups.

News from California

By Fred A. Herr

Superchrome Engineering Co., specialists in hard chromium plating, has augmented its plant facilities at 1504 East Washington Blvd., Los Angeles, with a new 20-foot-long hard chromium tank, bringing its total capacity to 9,000 gallons. The new tank was acquired to handle 18 foot long oil tubes which the firm plates.

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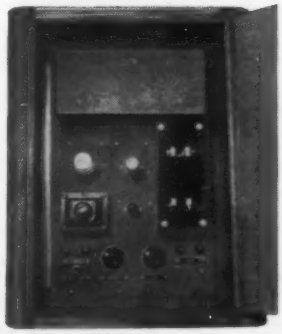

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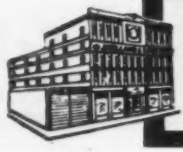

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job shops in the Los Angeles area equipped for hard chromium plating aircraft, oil industry and shipyard items, such as long casings, high and low pressure turbines, and Diesel shafts. The firm plates marine parts for Todd Shipbuilding Co. and Craig Shipyards of San Pedro, Calif. (Los Angeles Harbor District). It also performs considerable work for the Navy, precise jobs of plating that call for the closest Navy deposition tolerances and which are performed under the supervision of Commander Sweezy, industrial manager of the Navy Shipyards at Long Beach. A recent job reported by *Kasmer F. Tarczynski*, Superchrome's general manager, involved a destroyer Diesel shaft, 5 feet long, 28 inches in diameter, which the company plated to 0.015" with a tolerance of only plus or minus 0.0001".

The company will be one of the few job plating shops sponsoring an exhibit booth at the *Western Metal Exposition* to be held in Pan Pacific Auditorium, Los Angeles, March 23 to 27. Displays of various samples of hard chromium plated aircraft, oil industry and shipyard salvage items will be featured, Tarczynski reported.

Since the passing of the founder, *William Zinder*, in 1951, the plant has been operated under the direction of the estate executives, with Tarczynski as general manager and technical director.

Rhys Ricky, formerly sales manager for *United Lead Construction Corp.*, Los Angeles, is now affiliated with *New England Lead Burning Co's.* Southern California branch at Whittier, Calif., which serves Arizona, New Mexico and the southern section of California.

George Weiss of Boston, Mass., president of the company, was in Los Angeles in mid-February as part of a business trip which brought him to the West to set up a Koroseal franchise at the New England Lead Burning Company's Salt Lake City, Utah, branch.

George Hetz, assistant to *John Millhorn* of the *Mefford Chemical Co's.* plating supply division, recently was elected president of the Southern California Sales Engineers' Association. This group was organized in 1952 with membership composed of sales engineers of firms engaged in the manufacture, processing or distribution of the various categories of chemicals, such as plating, petroleum, cosmetics, pharmaceutical, paint, etc. George is also active in the affairs of the *American Electro-Platers' Society* as sergeant-at-arms of Los Angeles Branch and general chairman of the committee arranging the 1953 annual educational session. This writer, a baseball fan, remembers George most fondly as the wielder of a potent home run bat at the platers' society annual baseball game.

Edsel L. Faulman, chairman of the board of the *Naraco* companies, made the announcement that Naraco is opening a new plant at 3462 San Fernando Road in Los Angeles, Calif. Operations will begin this month. This new addition to Naraco's family of five will be known as *The Industrial Rack Co.* The other factories are *The American Rack* of Cicero, Ill., *The National Rack*, having two plants in Paterson,

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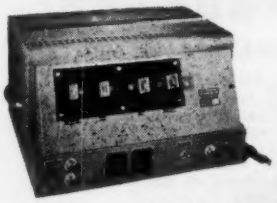

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N. J. and the two plants of *Imperial Plating Rack Co.* of Flint and Hazel Park, Mich. With the establishment of The Industrial Rack Company, Naraco is extending their services to the metal finishing industries from coast to coast.

The Industrial Rack building houses many special pieces of custom designed Naraco equipment. Executive offices are situated within the plant and are geared to handle orders with speed and efficiency. A section of the plant has been reserved for the engineering staff and research development units. Special plating rack problems on latest types of finishes will be handled by these departments.

William Zube, former president of Naraco's Cicero plant has been appointed as president of Industrial.

D. N. Eldred, head of the *Eldred Laboratories* of Los Angeles, analytical chemists and solution experts for the Southern Calfiornia plating industry, has announced the affiliation with his organization as partner and laboratory technician of *Don Baudraud*, who was formerly connected with the plating department of the Lumidor Mfg. Co., of Los Angeles.

Paul Franke of the *Price-Pfister Co's.* plating department, lets no extraneous interests, such as birthday parties given in his honor, interfere with his attendance at A.E.S. meetings. Paul's birthday is on February 11th. Three times since he joined Los Angeles Branch in 1946 his birthday has fallen on A.E.S. meeting night. Each time Paul attended the meeting notwithstanding that a birthday party was under way at his home.

Paul admits to a few more years than Jack Benny's traditional 39. "Twenty More", says Paul. At the February 11 meeting he was accorded the honor of sitting beside Mrs. Blum, wife of the celebrated *Dr. William Blum*. And while the rest of the membership ate the regulation ham steak and yams, the management of the Rodger Young Cafe served Paul his favorite dish, *Sauerbraten und Kartoffel Pfannekuchen*, a sort of a potroast with potato pancakes.

Phillip H. Threshie, Jr., has been appointed a sales engineer for the *Norton Co.* of Worcester, Mass., assigned to the Pacific Coast district. He was formerly connected with the Acushnet Process Co. of New Bedford, Conn., as assistant purchasing agent.

American Electroneering Corp. has

COMING EVENTS OF THE A. E. S.

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construction underway on a new factory at 2040 Colorado Street, Santa Monica, Calif., into which facilities will be moved about mid-summer from the present plant at 5029 West Jefferson Blvd., Los Angeles.

Six western divisions of national technical societies will present separate technical sessions in Los Angeles during the week of March 23 and 27 when the *American Society for Metals* holds the Western Metals Congress and Exposition at the Los Angeles Statler Hotel and Pan Pacific Auditorium.

In addition to six technical sessions to be presented at the Statler Hotel under the sponsorship of the A.S.M. from March 23 through March 26, other societies will hold sessions as follows: *American Welding Society, Society for Non-Destructive Testing, American Foundrymen's Society, American Institute of Mining, Society of Automotive Engineers,* and *American Institute of Mining and Metallurgical Engineers.*

While the technical sessions are taking place at the hotel, the Metal Exposition will be in progress in the Pan Pacific Auditorium in the Hollywood district. More than 279 leading industrial firms are expected to have educational displays, presenting in operation ferrous and non-ferrous metals techniques, heat treating, testing and finishing equipment.

NEW BOOKS

Lead in Modern Industry

Published by Lead Industries Ass'n., 420 Lexington Ave., New York 17, N. Y. Price $1.50. 230 pages.

This is the only book currently available, devoted exclusively to the subject of lead, and covers the metal from the mine to the rooftop. Although the subject of lead deposition is covered only briefly, the book would be a good addition to the plant library since it contains extensive data on the chemical and physical properties of various lead alloys in readily available form. The detailed descriptions of the proper methods of installing lead where its application is advisable are alone worth the very low price of this cloth bound volume.

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Fifty-Year Index to A.S.T.M. Technical Papers and Reports

Published by American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. 1952. 216 pages. Price: $6.00.

Covering the period from 1898 through 1950, this volume provides an alphabetic subject and author index to all the reports and technical papers published by A.S.T.M. in the Bulletin, Proceedings, Special Technical Publications and special compilations of standards. In addition, a number of technical reports have been referenced, which are the result of cooperative effort in technical committees but are not credited to any specific author.

Hundreds of headings will be found in the subject index and every report is listed under major subjects and material discussed. There is a separate condensed subject index listing all of the technical symposiums.

Journal Electrodepositors' Technical Society

Published by Institute of Metal Finishing, 32 Great Ormond St., London, W. C. 1. 1952. 337 pages plus index. Price: 2 Guineas.

Volume 27 covers the proceedings of the Institute for 1950 and 1951 and includes the papers presented at the various meetings during those years,

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together with the discussions which followed. These papers, collectively, offer a survey of technical development in the field of metal finishing and belong on every library shelf, where the invaluable information to be found therein can readily be referred to. Readers who have noted the general excellence of the papers reprinted from time to time in METAL FINISHING, can be assured that practically all the papers in Volume 27 are up to the same standard of quality.

OBITUARIES

STANLEY A. DAY

Stanley A. Day, 81, former president of the *S. A. Day Mfg. Co., Inc.*, 1483 Niagara St., Buffalo, N. Y., died February 12 in a sanitarium in Rochester. He had been in failing health for about eight months.

Mr. Day was a descendant of Barnabas Day, a pre-Revolutionary settler, who later migrated to the Province of Ontario. Mr. Day was born in Kingston, Ont., where he received most of his education. He also attended school in Watertown, N. Y.

He established the S. A. Day plant in Buffalo in 1912, and was actively engaged in that firm which manufactures platers' and polishers' supplies, until he retired in 1944. His son, *Harold A. Day*, president of S. A. Day Mfg. Co., has carried on the business since his father retired.

One of the oldest Masonic past masters in New York State, Mr. Day served Girard Lodge 631, F. & A.M., Brooklyn, and was a life member of the lodge. He was also a member of Orient Chapter 138, Royal Arch Masons, Brooklyn.

Surviving are a daughter, Mrs. Andrew C. Beagle; two sons, Stanley N., of Euclid, O. and Harold A. Day, of Grand Island, and a sister, Mrs. Frank Merserau, Montreal, Quebec.

GEORGE R. WEBER

George R. Weber, vice-president, treasurer and a director of *Raybestos-Manhattan, Inc.*, and general manager of its U. S. Asbestos Division plant at Manheim, Pa., died January 14 at his home in Lancaster, Pa.

Mr. Weber became affiliated with the U. S. Asbestos plant in 1921 and took an important part in creating the Raybestos-Manhattan merger in 1929. He was also an officer of Appel and Weber, Lancaster jewelers; a member of the board of directors of St. Joseph's Hospital and the Fulton National Bank, both of Lancaster; a member of the Hamilton Club and Lancaster Country Club, and the Everglades Club, Palm Beach, Florida.

LETTER TO THE EDITOR

Metal Finishing
Westwood, N. J.

Gentlemen:

My sincere congratulations on your 50th anniversary. I can testify to your wonderful helpfulness and guidance of every phase of the finishing industry.

If all the platers who have been helped by your publication were to express their thanks by writing, what in the world would you do with such a pile of letters? I'm just one of those who is glad to say thank you.

Yours sincerely,
Edward W. T. Faint

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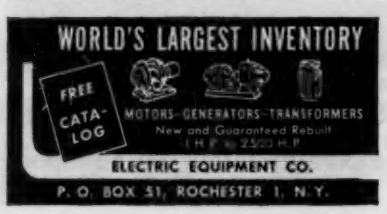

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1—EAGER ELECTRIC 5000/2500 amperes, 6/12 volts, 514 RPM, separately excited. Ser. #1844.

1—HANSON VAN WINKLE MUNNING 2000 ampere, 18 volts, 850 RPM. Separately excited Synchronous, Ser. #7719.

1—CHANDEYSSON ELECTRIC 1500/750 ampere, 9/18 volt, interpole design, 900 RPM, synchronous motor with exciter in head. Ser. #31203.

1—COLUMBIA ELECTRIC 1500/750 ampere, 6/12 volt, interpole design, 1200 RPM, exciter in head. Ser. #4545247.

2—BOGUE ELECTRIC 1000/500 ampere, 6/12 volt, interpole design, 1165 RPM, exciter in head. Ser. #'s 2014 & 2015.

1—ELECTRIC PRODUCTS 500 ampere, 9 volts, 900 RPM, separately excited.

FOLLOWING SETS SYNCHRONOUS—3 phase, 25 cycle, 220/440 volts — COMPLETE.

1—ELECTRIC PRODUCTS 1500/750 ampere, 6/12 volts, 375 RPM, Exciter in head, 25 Deg. C. Ser. #291195.

1—CHANDEYSSON ELECTRIC 3000/1500 ampere, 6/12 volts, 375 RPM Exciter in head. 40 Deg. C, Ser. #26174.

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5—1500 ampere, 5-12 volts.

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